NEET

Chapter-wise & Topic-wise Solved Questions

38 YEARS

2025-1988

PHYSICS

EXTRA PYQs
From 2024 Re-NEET, 2023 Manipur & More

REVISION FRIENDLY
Highlighted must Revise Questions for Last time Revision

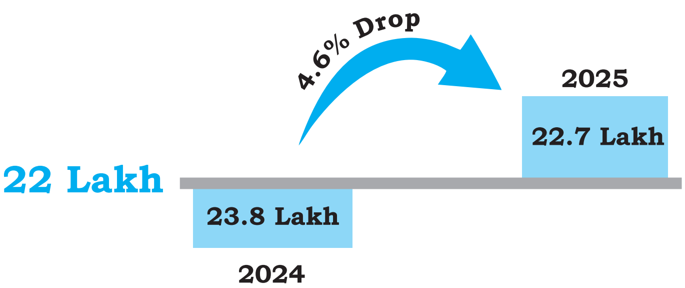
100% VERIFIED
100% Verified From NTA Answers Keys

NMC UPDATED
Updated as per Latest NMC syllabus

NEW TOPICS
Practice Questions for Newly added NEET Topics

NEET BLUEPRINT: ANALYZING PATTERNS FOR EXAM MASTERY

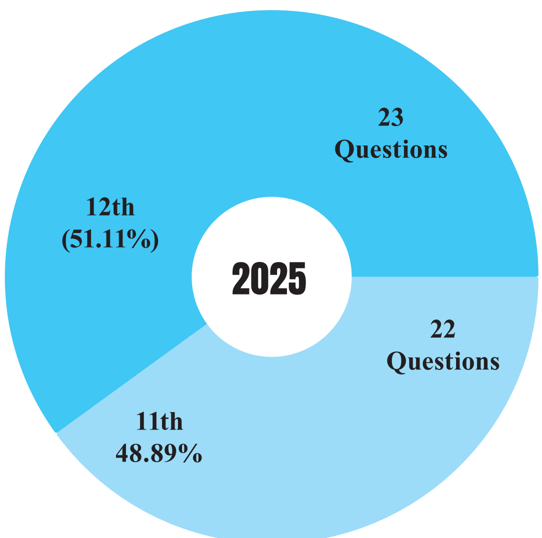
Registered Candidate Comparison



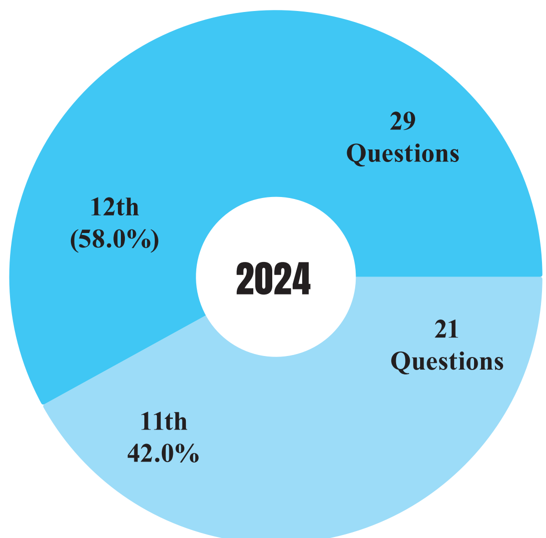
	2024	2025
Female	13.6 Lakh	12.41 Lakh
Male	10.18 Lakh	10.29 Lakh

Class-wise Comparison

Physics



Physics



Question Type Analysis (NEET 2025)						
Subject	**Single Choice**	**Statement II**	**Multi Statement**	**Assertion & Reason**	**Match the Column**	**Grand Total**
Physics	44	0	1	0	0	45
Chemistry	33	4	1	1	6	45
Botany	26	5	6	4	6	47
Zoology	26	3	8	1	5	43
Total	**129**	**12**	**16**	**6**	**17**	**180**

Question Type Analysis (NEET 2024)						
Subject	**Single Choice**	**Statement II**	**Multi Statement**	**Assertion & Reason**	**Match the Column**	**Grand Total**
Physics	44	1	2	1	2	50
Chemistry	37	5	1	0	7	50
Botany	24	5	8	0	13	50
Zoology	17	5	8	2	18	50
Total	**122**	**16**	**19**	**3**	**40**	**50**

Physics-XII

Chapters Name	Year Wise Number of Questions															
	2025	2024 Re	2024	2023	2023 Manipur	2022	2022 Re	2021	2020	2020 Covid	2019	2018	2017	2016 II	2016 I	2015
Electric Charges and Fields	1	1	0	2	3	1	2	1	1	1	3	0	1	0	1	1
Electrostatic Potential and Capacitance	3	3	5	2	1	2	2	4	3	2	0	1	2	1	1	1
Current Electricity	3	5	4	5	4	3	4	4	3	4	3	3	2	2	2	3
Moving Charges and Magnetism	3	0	2	2	2	3	4	3	1	0	2	2	1	3	2	2
Magnetism and Matter	0	4	2	1	1	1	0	1	1	1	1	2	2	0	1	0
Electromagnetic Induction	0	1	2	1	1	2	1	1	0	2	2	1	2	1	1	1
Alternating Current	2	3	1	3	4	2	3	4	2	2	0	1	0	3	2	1
Electromagnetic Waves	1	3	1	2	1	2	2	1	1	2	2	1	1	1	0	2
Ray Optics and Optical Instruments	2	1	2	3	5	3	2	5	3	5	3	2	2	3	3	2
Wave Optics	2	3	2	1	0	1	2	0	2	1	1	3	3	1	1	1
Dual Nature of Radiation and Matter	2	2	2	2	2	2	2	1	3	2	1	2	2	1	2	2
Atoms	2	2	2	2	3	1	1	0	1	1	1	1	1	2	1	1
Nuclei	0	2	1	1	0	2	2	3	2	2	1	1	1	1	0	1
Semiconductor Electronics	2	3	3	3	3	3	3	2	4	4	2	3	3	3	2	2

Contents Cum Topic Weightage

The following abbreviations have been used in the book:

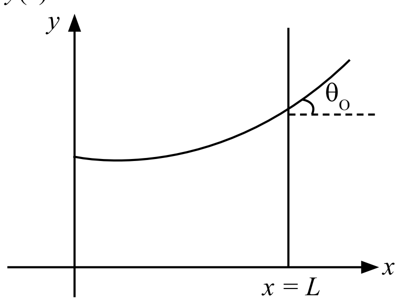
[MR*] - Must Revise Questions **[OS] - Outside NCERT Questions**

Class-XI

Class-XII

Year 2025 NEET Solved Paper

1. Consider a water tank shown in the figure. It has one wall at $x = L$ and can be taken to be very wide in the z direction. When filled with a liquid of surface tension S and density ρ, the liquid surface makes angle θ_0 ($\theta_0 << 1$) with the x-axis at $x = L$. If $y(x)$ is the height of the surface then the equation for $y(x)$ is:



(take $\theta(x) = \sin\theta(x) = \tan\theta(x) = \frac{dy}{dx}$, g is the acceleration due to graity)

a. $\frac{d^2y}{dx^2} = \frac{\rho g}{S}x$ b. $\frac{d^2y}{dx^2} = \frac{\rho g}{S}y$

c. $\frac{d^2y}{dx^2} = \sqrt{\frac{\rho g}{S}}$ d. $\frac{dy}{dx} = \sqrt{\frac{\rho g}{S}}x$

2. A microscope has an objective of focal length 2 cm, eyepiece of focal length 4 cm and the tube length of 40 cm. If the distance of distinct vision of eye is 25 cm; the magnification in the microscope is:

a. 100 b. 125

c. 150 d. 250

3. An electron (mass 9×10^{-31} kg and charge 1.6×10^{-19} C) moving with speed c/100 (c = speed of light) is injected into a magnetic field $\vec{B}$ of magnitude 9×10^{-4} T perpendicular to its direction of motion. We wish to apply an uniform electric field $\vec{E}$ together with the magnetic field so that the electron does not deflect from its path. Then (speed of light $c = 3 \times 10^8$ ms^{-1}).

a. $\vec{E}$ is perpendicular to $\vec{B}$ and its magnitude is 27×10^4 V m^{-1}

b. $\vec{E}$ is perpendicular to $\vec{B}$ and its magnitude is 27×10^2 V m^{-1}

c. $\vec{E}$ is parallel to $\vec{B}$ and its magnitude is 27×10^2 V m^{-1}

d. $\vec{E}$ is parallel to $\vec{B}$ and its magnitude is 27×10^4 V m^{-1}

4. There are two inclined surfaces of equal length (L) and same angle of inclination 45° with the horizonal. One of them is rough and the other is perfectly smooth. A given body takes 2 times as much time to slide down on rough surface than on the smooth surface. The coefficient of kinetic friction (μ_k) between the object and the rough surface is close to:

a. 0.25 b. 0.40

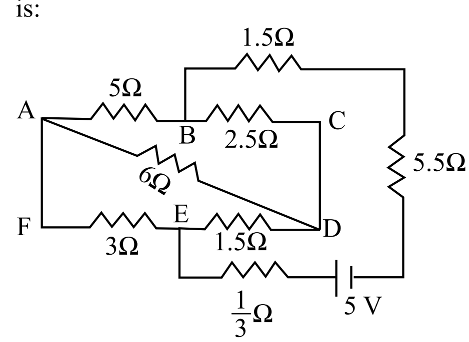
c. 0.5 d. 0.75

5. The kinetic energies of two similar cars A and B are 100 J and 225 J respectively. On applying breaks, car A stops after 1000 m and car B stops after 1500 m. If F_A and F_B are the forces applied by the breaks on cars A and B, respectively, then the ratio F_A/F_B is:

a. $\frac{3}{2}$ b. $\frac{2}{3}$

c. $\frac{1}{3}$ d. $\frac{1}{2}$

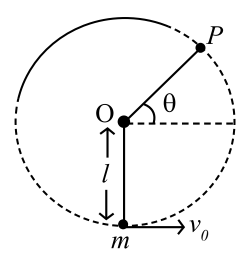
6. The current passing through the battery in the given circuit, is:



a. 2.0 A b. 0.5 A

c. 2.5 A d. 1.5 A

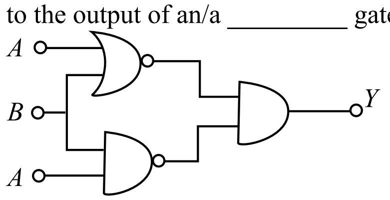
7. A bob of heavy mass m is suspended by a light string of length l. The bob is given a horizontal velocity v_0 as shown in figure. If the string gets slack at some point P making an angle θ from the horizontal, the ratio of the speed v of the bob at point P to its initial speed v_0 is:



a. $(\sin\theta)^{1/2}$ b. $\left(\dfrac{1}{2+3\sin\theta}\right)^{1/2}$

c. $\left(\dfrac{\cos\theta}{2+3\sin\theta}\right)^{1/2}$ d. $\left(\dfrac{\sin\theta}{2+3\sin\theta}\right)^{1/2}$

8. The output (Y) of the given logic implementation is similar to the output of an/a _________ gate.

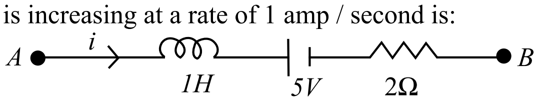


a. AND b. NAND
c. OR d. NOR

9. The electric field in a plane electromagnetic wave is given by $E_z = 60\cos(5x + 1.5\times 10^9 t)\ V/m$.
Then expression for the corresponding magnetic field is (here subscripts denote the direction of the field):
a. $B_y = 2\times 10^{-7}\cos(5x + 1.5\times 10^9 t)T$
b. $B_x = 2\times 10^{-7}\cos(5x + 1.5\times 10^9 t)T$
c. $B_z = 60\cos(5x + 1.5\times 10^9 t)T$
d. $B_y = 60\sin(5x + 1.5\times 10^9 t)T$

10. A ball of mass 0.5 kg is dropped from a height of 40 m. The ball hits the ground and rises to a height of 10 m. The impulse imparted to the ball during its collision with the ground is (Take $g = 9.8\ m/s^2$)
a. 21 NS b. 7 NS
c. 0 d. 84 NS

11. AB is a part of an electrical circuit (see figure). The potential difference "$V_A - V_B$", at the instant when current $i = 2\ A$ and is increasing at a rate of 1 amp / second is:



a. 5 volt b. 6 volt
c. 9 volt d. 10 volt

12. A 2 amp current is flowing through two different small circular copper coils having radii ratio 1 : 2. The ratio of their respective magnetic moments will be:
a. 1 : 4 b. 1 : 2
c. 2 : 1 d. 4 : 1

13. In a certain camera, a combination of four similar thin convex lenses are arranged axially in contact. Then the power of the combination and the total magnification in comparison to the power (p) and magnification (m) for each lens will be, respectively–
a. $4p$ and $4m$ b. p^4 and $4m$
c. $4p$ and m^4 d. p^4 and m^4

14. An oxygen cylinder of volume 30 litre has 18.20 moles of oxygen. After some oxygen is withdrawn from the cylinder, its gauge pressure drops to 11 atmospheric pressure at temperature 27°C. The mass of the oxygen withdrawn from the cylinder is nearly equal to:
[Given, $R = \dfrac{100}{12}$ J $mol^{-1}\ K^{-1}$, and molecualr mass of $O_2 = 32$,
a. 0.125 kg b. 0.144 kg
c. 0.116 kg d. 0.156 kg

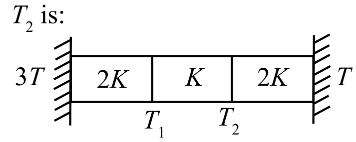
15. In some appropriate units, time (t) and position (x) relation of a moving particle is given by $t = x^2 + x$. The acceleration of the particle is:
a. $-\dfrac{2}{(x+2)^3}$ b. $-\dfrac{2}{(2x+1)^3}$
c. $+\dfrac{2}{(x+1)^3}$ d. $+\dfrac{2}{2x+1}$

16. To an ac power supply of 220 V at 50 Hz, a resistor of 20 Ω, a capacitor of reactance 25Ω and an inductor of reactance 45Ω are connected in series. The corresponding current in the circuit and the phase angle between the current and the voltage is, respectively:
a. 7.8 A and 30° b. 7.8 A and 45°
c. 15.6 A and 30° d. 15.6 A and 45°

17. The Sun rotates around its centre once in 27 days. What will be the period of revolution if the Sun were to expand to twice its present radius without any external influence? Assume the Sun to be a sphere of uniform density.
a. 100 days b. 105 days
c. 115 days d. 108 days

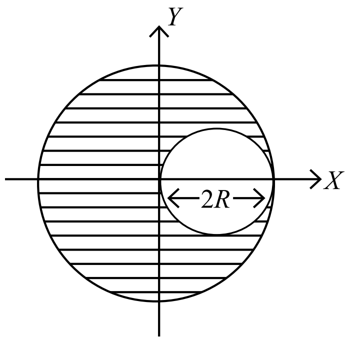
18. A model for quantized motion of an electron in a uniform magnetic field B states that the flux passing through the orbit of the electron in $n(h/e)$ where n is an integer, h is Plank's constant and e is the magnitude of electron's charge. According to the model, the magnetic moment of an electron in its lowest energy state will be (m is the mass of the electron).
a. $\dfrac{he}{\pi m}$ b. $\dfrac{he}{2\pi m}$
c. $\dfrac{heB}{\pi m}$ d. $\dfrac{heB}{2\pi m}$

19. Three identical heat conducting rods are connected in series as shown in the figure. The rods on the sides have thermal conductivity $2K$ while that in the middle has thermal conductivity K. The left end of the combination is maintained at temperature 37 and the right end at T. The rods are thermally insulated from outside. In steady state, temperature at the left junction is T_1 and that at the right junction is T_2. The ratio T_1/T_2 is:



a. $\dfrac{3}{2}$ b. $\dfrac{4}{3}$
c. $\dfrac{5}{3}$ d. $\dfrac{5}{4}$

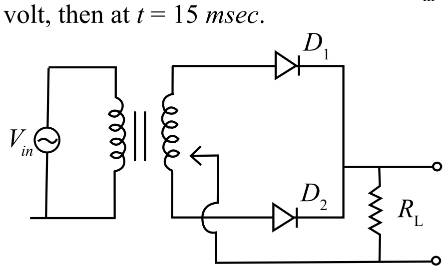
20. The plates of a parallel plate capacitor are separated by d. Two slabs of different dielectric constant K_1 and K_2 with thickness $\dfrac{3}{8}d$ and $\dfrac{d}{2}$, respectively are inserted in the capacitor. Due to this, the capacitance becomes two times larger than when there is nothing between the plates.
If $K_1 = 1.25\ K_2$, the value of K_1 is:
a. 2.66 b. 2.33
c. 1.60 d. 1.33



a. $\frac{7}{8}$ b. $\frac{7}{40}$

c. $\frac{7}{57}$ d. $\frac{7}{64}$

40. A full wave rectifier circuit with diodes (D_1) and (D_2) is shown in the figure. If input supply voltage V_{in} = 220 sin (100 π *t*) volt, then at *t* = 15 *msec*.



a. D_1 is forward biased, D_2 is reverse biased.
b. D_1 is reverse biased, D_2 is forward biased.
c. D_1 and D_2 both are forward biased.
d. D_1 and D_2 both are reverse biased.

41. Two gases *A* and *B* are filled at the same pressure in separate cylinders with movable pistons of radius r_A and r_B, respectively. ON supplying an equal amount of heat to both the systems reversibly under constant pressure, the pistons of gas *A* and *B* are displaced by 16 cm and 9 cm, respectively. If the change in their internal energy is the same, then the ratio $\frac{r_A}{r_B}$ is equal to:

a. $\frac{4}{3}$ b. $\frac{3}{4}$

c. $\frac{2}{\sqrt{3}}$ d. $\frac{\sqrt{3}}{2}$

42. A physical quantity *P* is related to four observations *a, b, c* and *d* as follows:

$P = a^3b^2 / c\sqrt{d}$

The percentage errors of measurement in *a, b, c* and *d* are 1%, 3%, 2% and 4% respectively. The percentage error in the quantity *P* is:

a. 10% b. 2%

c. 13% d. 15%

43. The intensity of transmitted light when a polarioid sheet, placed between two crossed polaroids at 22.5° from the polarization axis of one of the polaroid, is (I_0 is the intensity of polarised light after passing through the first polaroid):

a. $\frac{I_0}{2}$ b. $\frac{I_0}{4}$

c. $\frac{I_0}{8}$ d. $\frac{I_0}{16}$

44. Two identical point masses *P* and *Q*, suspended from two separate massless springs of spring constants k_1 and k_2, respectively, oscillate vertically. If their maximum speeds are the same, the ratio (A_Q/A_P) of the amplitude A_Q of mass *Q* to the amplitude A_P of mass *P* is:

a. $\frac{k_2}{k_1}$ b. $\frac{k_1}{k_2}$

c. $\sqrt{\frac{k_2}{k_1}}$ d. $\sqrt{\frac{k_1}{k_2}}$

45. A pipe open at both ends has a fundamental frequency *f* in air. The pipe is now dipped vertically in a water drum to half of its length. The fundamental frequency of the air column is now equal to:

a. $\frac{f}{2}$ b. *f*

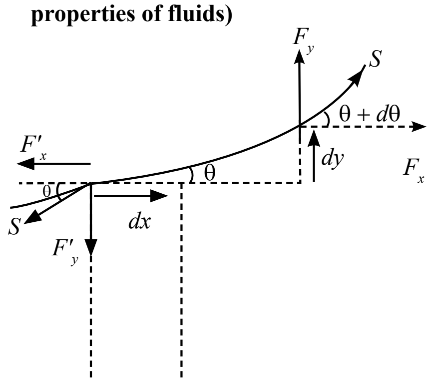
c. $\frac{3f}{2}$ d. 2*f*

Answer Key

1. (b)	**2.** (b)	**3.** (b)	**4.** (d)	**5.** (b)	**6.** (b)	**7.** (d)	**8.** (d)	**9.** (a)	**10.** (a)
11. (d)	**12.** (a)	**13.** (c)	**14.** (c)	**15.** (b)	**16.** (b)	**17.** (d)	**18.** (b)	**19.** (c)	**20.** (a)
21. (d)	**22.** (b)	**23.** (b)	**24.** (c)	**25.** (c)	**26.** (c)	**27.** (a)	**28.** (d)	**29.** (b)	**30.** (c)
31. (a)	**32.** (b)	**33.** (c)	**34.** (b)	**35.** (b)	**36.** (b)	**37.** (c)	**38.** (a)	**39.** (c)	**40.** (b)
41. (b)	**42.** (c)	**43.** (c)	**44.** (d)	**45.** (b)					

Explanations

1. (b) (NCERT XI, Part-II, Ch-Mechanical properties of fluids)



For the given element, (consider length L in Z direction) Net force in upward direction = Weight (S sin(θ + dθ) – S sinθ)

L = mg

Angle is small ∴ sinθ ≈ θ

$$\Rightarrow \frac{d\theta}{ydx} = \frac{\rho g}{S} \quad ..... (1)$$

$$\tan\theta = \frac{dy}{dx}$$

$$\Rightarrow \sec^2\theta \frac{d\theta}{dx} = \frac{d^2y}{dx^2} \quad ..... (2)$$

Put $d\theta$ from (2) in (1) take cos θ ≈ 1, we get

$$\Rightarrow \frac{1}{4} = 1 - \mu$$

2. (b) (NCERT XII, Part-II, Ch-Ray Optics and Optical Instruments, Page-240)

f_0 = 2 cm f_e = 4 cm

L = 40 cm D = 25 cm

When image is formed at infinity

$$\text{Magnification} = \frac{L}{f_0}\cdot\frac{D}{f_e}$$

$$= \frac{40}{2}\times\frac{25}{4}$$

= 125

3. (b) (NCERT XII, Part-I, Ch-Moving Charges and Magnetism, Page-109)

A particle goes undeflected when Magnetic force = Electric force

qE = qVB sin90

$$E = \frac{c}{100} \times 9\times10^{-4} \sin 90$$

$E = 27\times10^2$ V/m and

$$\vec{E} = \vec{B}\times\vec{V}$$

4. (d) (NCERT XI, Part-I, Ch-Laws of motion, Page-61)

On smooth surface acceleration on a_1 = g sinθ & on rough surface a_2 = g sinθ – μg cosθ

$$L = \frac{1}{2}a_1t_1^2 = \frac{1}{2}a_2t_2^2$$

$$\Rightarrow \left(\frac{t_S}{t_R}\right)^2 = \frac{a_2}{a_1}$$

$$\Rightarrow \left(\frac{1}{2}\right)^2 = \frac{g\sin\theta - \mu g\cos\theta}{g\sin\theta}$$

$$\Rightarrow \frac{1}{4} = \frac{\sin 45° - \mu\cos 45°}{\sin 45°}$$

$$\Rightarrow \frac{1}{4} = 1-\mu \Rightarrow \mu = 1 - \frac{1}{4} = \frac{3}{4} = 0.75$$

5. (b) (NCERT XI, Part-I, Ch-Work Energy and Power, Page-73)

Work done by forces = change in kinetic energy

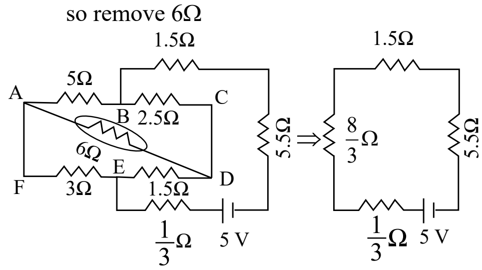
$$\frac{(\Delta)KE)_A}{(\Delta)KE)_B} = \frac{-F_A\Delta r_A}{-F_B\Delta r_B}$$

$$\frac{-100}{-225} = \frac{-F_A(1000)}{-F_B(1500)}$$

$$\Rightarrow \frac{F_A}{F_B} = \frac{2}{3}$$

6. (b) (NCERT XII, Part-I, Ch-Current Electricity, Page-97)

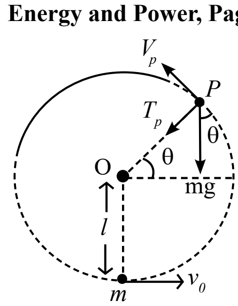
Diagram is a balanced wheatstone bridge so remove 6Ω



$$R_{eq} = \frac{1}{3} + \frac{8}{3} + 1.5 + 5.5$$

$$i = \frac{V}{R_{eq}} = \frac{5}{\frac{1}{3}+\frac{8}{3}+1.5+5.5} = \frac{5}{10} = 0.5A$$

7. (d) (NCERT XI, Part-I, Ch-Work Energy and Power, Page-79)



At pt P

Component of mg along PO = centripetal force

$$Tp + \text{mg} \sin\theta = \frac{mv_p^2}{\ell} \text{ (as } T_p = 0)$$

$$\text{mg} \sin\theta = \frac{mv_p^2}{\ell} \Rightarrow mv_p^2 = mg\ell\sin\theta \text{ ....(i)}$$

From mechanical energy conservation

$$\frac{1}{2}mv_0^2 = mg\ell(1+\sin\theta) + \frac{1}{2}mv_p^2 \quad \text{......(ii)}$$

From (i) & (ii)

$$\frac{1}{2}mv_0^2 = mg\ell(1+\sin\theta) + \frac{1}{2}mg\ell\sin\theta$$

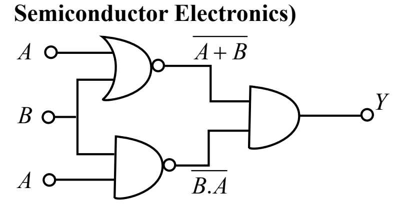
$$\Rightarrow v_0 = \sqrt{2g\ell + 3g\ell\sin\theta} \quad \text{......(iii)}$$

$$v_p = \sqrt{g\ell\sin\theta}$$

$$v_0 = \sqrt{2g\ell + 3g\ell\sin\theta}$$

$$\frac{v_p}{v_0} = \sqrt{\frac{\sin\theta}{2+3\sin\theta}}$$

8. (d) (NCERT XII, Part-II, Ch-Semiconductor Electronics)



& the output of NOR gate is $\overline{A+B}$ the output of NAND gate is $\overline{AB}$

Output of AND gate Y is $Y = \overline{A+B}.\overline{A.B}$

$$y \Rightarrow \bar{A}.\bar{B}.(\bar{A}+\bar{B})$$

$$\Rightarrow \bar{A}.\bar{B}.\bar{A} + \bar{A}.\bar{B}.\bar{B}$$

$$\Rightarrow \bar{A}.\bar{B} + \bar{A}.\bar{B}$$

$$\Rightarrow \bar{A}.\bar{B} = \overline{(A+B)}$$

Behaves as NOR gate

9. (a) (NCERT XII, Part-I, Ch-Electromagnetic waves, Page-207)

Velocity of wave is given by

$$v = \frac{\omega}{k} = \frac{1.5\times10^9}{5} = 3\times10^8 \text{ m/s}$$

$$B_0 = \frac{\textit{Electric Field } (E_0)}{\textit{Speed } (v)} = \frac{60}{3\times10^8}$$

$= 20\times10^{-8}$ m/s $= 2\times10^{-7}$ T

$$\bar{E}\times\bar{B} = \bar{C}$$

$B_y = 2\times10^{-7}\cos(5x + 1.5\times10^9 t)$T

10. (a) (NCERT XI, Part-I, Ch-Laws of Motion, Page-55)

Impulse = change in momentum

Initial velocity $-\sqrt{2gh_i} = -\sqrt{2\times9.8\times10}$

= –28 m/s

CHAPTER 1 Units and Measurements

Systems of Units

1. The angle of 1' (minute of arc) in radian is nearly equal to, *(2020-Covid)*
a. 4.85×10^{-4} rad b. 4.80×10^{-6} rad
c. 1.75×10^{-2} rad d. 2.91×10^{-4} rad

2. The unit of thermal conductivity is *(2019)*
a. $W\,m^{-1}\,K^{-1}$ b. $J\,m\,K^{-1}$
c. $J\,m^{-1}\,K^{-1}$ d. $W\,m\,K^{-1}$

3. The damping force on an oscillator is directly proportional to the velocity. The units of the constant of proportionality are: *(2012 Pre)*
a. $kgms^{-1}$ b. kg/ms c. kgs^{-1} d. kgs

4. The density of a material in CGS system of units is 4 g/cm^3. In a system of units in which unit of length is 10 cm and unit of mass is 100 g, the value of density of material will be: [**MR**☆] *(2011 Mains)*
a. 0.4 b. 40 c. 400 d. 0.04

5. If $x = at + bt^2$, where x is the distance travelled by the body in kilometres while t is the time in seconds, then the units of b is: *(1989)*
a. km/s b. kms c. km/s^2 d. kms^2

Dimensions of Physical Quantities

6. The quantities which have the same dimensions as those of solid angle are: *(2024)*
a. strain and arc b. angular speed and stress
c. strain and angle d. stress and angle

7. A force defined by $F = \alpha t^2 + \beta t$ acts on a particle at given time t. The factor which is dimensionless, if α and β are constants, is: *(2024)*
a. $\alpha\beta t$ b. $\alpha\beta/t$
c. $\beta t/\alpha$ d. $\alpha t/\beta$

8. Plane angle and solid angle have: *(2022)*
a. Both units and dimension
b. Units but no dimensions
c. Dimensions but no units
d. No units and no dimensions

9. The dimension $[MLT^{-2}A^{-2}]$ belong to the: *(2022)*
a. electric permittivity b. magnetic flux
c. self inductance d. magnetic permeability

10. If E and G respectively denote energy and gravitational constant, then $\frac{E}{G}$ has the dimensions of: [**MR**☆] *(2021)*
a. $[M][L^{-1}][T^{-1}]$ b. $[M][L^0][T^0]$
c. $[M^2][L^{-2}][T^{-1}]$ d. $[M^2][L^{-1}][T^0]$

11. Dimensions of stress are: *(2020)*
a. $[ML^2T^{-2}]$ b. $[ML^0T^{-2}]$
c. $[ML^{-1}T^{-2}]$ d. $[MLT^{-2}]$

12. The dimensions of $(\mu_0\varepsilon_0)^{-1/2}$ are: *(2012 Mains)*
a. $[L^{1/2}T^{-1/2}]$ b. $[L^{-1}T]$
c. $[LT^{-1}]$ d. $[L^{1/2}T^{1/2}]$

13. The dimension of $\frac{1}{2}\varepsilon_o E^2$, where ε_0 is permittivity of free space and E is electric field, is: *(2010 Pre)*
a. MLT^{-1} b. ML^2T^{-2}
c. $ML^{-1}T^{-2}$ d. ML^2T^{-1}

14. If the dimensions of a physical quantity are given by $M^aL^bT^c$, then the physical quantity will be: *(2009)*
a. Velocity if a = 1, b = 0, c = –1
b. Acceleration if a = 1, b = 1, c = –2
c. Force if a = 0, b = –1, c = –2
d. Pressure if a = 1, b = –1, c = –2

15. Which two of the following five physical parameters have the same dimensions? *(2008)*
A. Energy density B. Refractive index
C. Dielectric constant D. Young's modulus
E. Magnetic field
a. (A) and (E) b. (B) and (D)
c. (C) and (E) d. (A) and (D)

16. 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: [**MR**☆] *(2007)*
a. ML^2T^{-2} b. $ML^2T^{-1}I^{-1}$
c. $ML^2T^{-3}I^{-2}$ d. $ML^2T^{-3}I^{-1}$

17. The dimensions of universal gravitational constant are: *(2004)*
a. ML^2T^{-1} b. $M^{-2}L^3T^{-2}$
c. $M^{-2}L^2T^{-1}$ d. $M^{-1}L^3T^{-2}$

18. The dimension of Planck constant equals to that of: *(2001)*
a. Energy b. Momentum
c. Angular momentum d. Power

19. Which pair have not equal dimensions? *(2000)*
a. Energy and torque
b. Force and impulse
c. Angular momentum and Planck's constant
d. Elastic modulus and pressure

20. The dimensions of impulse are equal to that of: *(1996)*
a. Pressure b. Linear momentum
c. Force d. Angular momentum

21. Which of the following dimensions will be the same as that of time? *(1996)*
a. $\frac{L}{R}$ b. $\frac{C}{L}$ c. LC d. $\frac{R}{L}$

22. Which of the following is a dimensional constant? *(1995)*
a. Relative density b. Gravitational constant
c. Refractive index d. Poisson ratio

23. The dimensions of RC is: *(1995)*
a. Square of time b. Square of inverse time
c. Time d. Inverse time

24. Which of the following has the dimensions of pressure? *(1994, 90)*
a. $[MLT^{-2}]$ b. $[ML^{-1}T^{-2}]$
c. $[ML^{-2}T^{-2}]$ d. $[M^{-1}L^{-1}]$

25. The dimensional formula of permeability of free space μ_0 is *(1991)*
a. $[MLT^{-2}A^{-2}]$ b. $[M^0L^{-1}T]$
c. $[M^0LT^{-1}A^2]$ d. None of these

26. According to Newton, the viscous force acting between liquid layers of area A and velocity gradient $\Delta v/\Delta Z$ is given by $F = -\eta A\frac{\Delta v}{\Delta Z}$, where η is constant called coefficient of viscosity. The dimensional formula of η is: [**MR**☆] *(1990)*
a. $[ML^{-2}T^{-2}]$ b. $[M^0L^0T^0]$
c. $[ML^2T^2]$ d. $[ML^{-1}T^{-1}]$

27. Which of the following quantities, which one has dimensions different from the remaining three? *(1989)*
a. Energy per unit volume
b. Force per unit area
c. Product of voltage and charge per unit volume
d. Angular momentum

28. Dimensional formula of self inductance is: *(1989)*
a. $[MLT^{-2}A^{-2}]$ b. $[ML^2T^{-1}A^{-2}]$
c. $[ML^2T^{-2}A^{-2}]$ d. $[ML^2T^2A^{-1}]$

29. The dimensional formula of torque is: *(1989)*
a. $[ML^2T^{-2}]$ b. $[MLT^{-2}]$
c. $[ML^{-1}T^{-2}]$ d. $[ML^{-2}T^{-2}]$

30. If C and R denote capacitance and resistance, the dimensional formula of CR is: *(1988)*
a. $[M^0L^0T^1]$ b. $[M^0L^0T^0]$
c. $[M^0L^0T^{-1}]$ d. Not expressible in terms of MLT

31. The dimensional formula of angular momentum is: *(1988)*
a. $[ML^2T^{-2}]$ b. $[ML^{-2}T^{-1}]$
c. $[MLT^{-1}]$ d. $[ML^2T^{-1}]$

Application of Dimensions

32. If force [F], acceleration [A] and time [T] are chosen as the fundamental physical quantities. Find the dimensions of energy. *(2021)*
a. $[F][A][T^2]$ b. $[F][A][T^{-1}]$
c. $[F][A^{-1}][T]$ d. $[F][A][T]$

33. 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]: [**MR**☆] *(2017-Delhi)*
a. $c^2\left[G\frac{e^2}{4\pi\varepsilon_0}\right]^{1/2}$ b. $\frac{1}{c^2}\left[\frac{e^2}{G4\pi\varepsilon_0}\right]^{1/2}$
c. $\frac{1}{c^2}G\frac{e^2}{4\pi\varepsilon_0}$ d. $\frac{1}{c^2}\left[G\frac{e^2}{4\pi\varepsilon_0}\right]^{1/2}$

34. 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? *(2016 - II)*
a. $\sqrt{\frac{hc}{G}}$ b. $\sqrt{\frac{Gc}{h^{3/2}}}$
c. $\frac{\sqrt{hG}}{c^{3/2}}$ d. $\sqrt{\frac{hG}{c^{5/2}}}$

35. If energy (E), velocity (V) and time (T) are chosen as the fundamental quantities, the dimensional formula of surface tension will be: *(2015)*
a. $[EV^{-1}T^{-2}]$ b. $[EV^{-2}T^{-2}]$
c. $[E^{-2}V^{-1}T^{-3}]$ d. $[EV^{-2}T^{-1}]$

36. If dimension of critical velocity of liquid flowing through a tube are expressed as $v_c \propto [\eta^x\rho^y r^z]$ 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: [**MR**☆] *(2015 - Re)*
a. 1, 1, 1 b. 1, –1, –1
c. –1, –1, 1 d. –1, –1, –1

37. If Force (F), Velocity (V) and Time (T) are taken as fundamental units, then the dimensions of mass are: *(2014)*
a. $[FVT^{-1}]$ b. $[FVT^{-2}]$
c. $[FV^{-1}T^{-1}]$ d. $[FV^{-1}T]$

38. 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)*

a. $[ML^2T^{-2}]$ b. $[ML^2T^{-1}I^{-1}]$
c. $[ML^2T^{-3}I^{-2}]$ d. $[ML^2T^{-3}I^{-1}]$

39. 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 respectively: [**MR**☆] *(2006)*

a. $[LT^{-2}]$, [L] and [T] b. [L], [T] and $[LT^2]$
c. $[L^2T^2]$, [LT] and [L] d. [L], [LT] and $[T^2]$

40. The ratio of the dimensions of Planck's constant and that of the moment of inertia is the dimension of: *(2005)*

a. Frequency
b. Velocity
c. Angular momentum
d. Time

41. An equation is given here $\left(P+\frac{a}{V^2}\right)=b\frac{\theta}{V}$ where P = Pressure, V = Volume and θ = Absolute temperature. If a and b are constants, the dimensions of a will be: *(1996)*

a. $[ML^{-5}T^{-1}]$ b. $[ML^5T^1]$
c. $[ML^5T^{-2}]$ d. $[M^{-1}L^5T^2]$

42. Turpentine oil is flowing through a tube of length l and radius r. The pressure difference between the–two ends of the tube is P. The viscosity of oil is given by $\eta = \frac{P(r^2-x^2)}{4vl}$ where v is the velocity of oil at a distance x from the axis of the tube. The dimensions of η are: *(1993)*

a. $[M^0L^0T^0]$ b. $[MLT^{-1}]$
c. $[ML^2T^{-2}]$ d. $[ML^{-1}T^{-1}]$

43. The time dependence of a physical quantity p is given by $p = p_0 \exp(-\alpha t^2)$, where α is constant and t is the time. The constant α: *(1993)*

a. Is dimensionless
b. Has dimensions $[T^{-2}]$
c. Has dimensions $[T^2]$
d. Has dimensions of p

44. P represents radiation pressure, c represents speed of light and S represents radiation energy striking per unit area per sec. The non-zero integers x, y, z such that $P^x S^y c^z$ is dimensionless are: *(1992)*

a. x = 1, y = 1, z = 1
b. x = – 1, y = 1, z = 1
c. x = 1, y = –1, z = 1
d. x =1, y – 1, z = – 1

45. The frequency of vibration f of a mass m suspended from a spring of spring constant k is given by a relation $f = am^xk^y$, where a is a dimensionless constant. The values of x and y are: *(1990)*

a. $x=\frac{1}{2}, y=\frac{1}{2}$ b. $x=-\frac{1}{2}, y=-\frac{1}{2}$
c. $x=\frac{1}{2}, y=-\frac{1}{2}$ d. $x=-\frac{1}{2}, y=\frac{1}{2}$

Errors

46. The errors in the measurement which arise due to unpredictable fluctuations in temperature and voltage supply are: *(2023)*

a. Random errors b. Instrumental errors
c. Personal errors d. Least count errors

47. A metal wire has mass (0.4± 0.002) g, radius (0.3± 0.001) mm and length (5 ± 0.02) cm. The maximum possible percentage error in the measurement of density will nearly be : *(2023)*

a. 1.4% b. 1.2%
c. 1.3% d. 1.6%

48. The percentage error in the measurement of g is:
(Given that $g = \frac{4\pi^2 L}{T^2}$, L (10 ± 0.1) cm, T = (100 ± 1) s) *(2022 Re)*

a. 7% b. 2%
c. 5% d. 3%

49. The intervals measured by a clock given the following readings: 1.25 s, 1.24 s, 1.27 s, 1.21 s and 1.28 s. What is the percentage relative error in the observations? *(2020-Covid)*

a. 4% b. 16%
c. 1.6% d. 2%

50. In an experiment, the percentage of error occurred in the measurement of physical quantities A, B, C and D are 1%, 2%, 3% and 4% respectively. Then the maximum percentage of error in the measurement of X, where $X = \frac{A^2B^{1/2}}{C^{1/3}D^3}$ will be [**MR**☆] *(2019)*

a $\left(\frac{3}{13}\right)\%$ b. 16%
c. – 10% d. 10%

51. In an experiment four quantities a, b, c and d are measured with percentage error 1%, 2%, 3% and 4% respectively. Quantity P is calculated as follows $P = \frac{a^3b^2}{cd}$. % error in P is: *(2013)*

a. 4% b. 14%
c. 10% d. 7%

52. A student measures the distance traversed in free fall of a body, initially at rest in a given time. He used this data to estimate g, the acceleration due to gravity. If the maximum percentage errors in measurement of the distance and the time are e_1 and e_2 respectively, the percentage error in the estimation of g is: *(2010 Mains)*

a. $e_2 - e_1$ b. $e_1 + 2e_2$
c. $e_1 + e_2$ d. $e_1 - 2e_2$

53. If the error in the measurement of radius of a sphere is 2%, then the error in the determination of volume of the sphere will be: *(2008)*

a. 2% b. 4%
c. 6% d. 8%

54. The error in measurement of radius of a sphere is 0.1% then error in its volume is: *(1999)*

a. 0.3% b. 0.4%
c. 0.5% d. 0.6%

55. The density of a cube is measured by measuring its mass and length of its sides. If the maximum error in the measurement of mass and lengths are 3% and 2% respectively, the maximum error in the measurement of density would be: *(1996)*

a. 12% b. 14%
c. 7% d. 9%

56. Percentage errors in the measurement of mass and speed are 2% and 3% respectively. The error in the estimate of kinetic energy obtained by measuring mass and speed will be: *(1995)*

a. 8% b. 2%
c. 12% d. 10%

57. A certain body weighs 22.42 g and has a measured volume of 4.7 cc. The possible, error in the measurement of mass and volume are 0.01 g and 0.1 cc. Then maximum error in the density will be: [**MR**☆] *(1991)*

a. 22% b. 2%
c. 0.2% d. 0.02%

Significant Figures

58. The diameter of a spherical bob, when measured with vernier callipers yielded the following values: 3.33 cm, 3.32 cm, 3.34 cm, 3.33 cm and 3.32 cm. The mean diameter to appropriate significant figures is: *(2023-Manipur)*

a. 3.328 cm b. 3.3 cm
c. 3.33 cm d. 3.32 cm

59. The area of a rectangular field (in m^2) of length 55.3 m and breadth 25 m after rounding off the value for correct significant digits is : [**MR**☆] *(2022)*

a. 14×10^2 b. 138×10^1
c. 1382 d. 1382.5

60. Taking into account of the significant figures, what is the value of 9.99 m – 0.0099 m? *(2020)*

a. 9.98 m b. 9.980 m
c. 9.9 m d. 9.9801 m

Measuring Instruments

61. The pitch of an error free screw gauge is 1 mm and there are 100 divisions on the circular scale. While measuring the diameter of a thick wire, the pitch scale reads 1 mm and 63rd division on the circular scale coincides with the reference line. The diameter of the wire is: *(2024 Re)*

a. 1.63 cm b. 0.163 cm
c. 0.163 m d. 1.63 m

62. In a vernier calipers, $(N + 1)$ divisions of vernier scale coincide with N divisions of main scale. If 1 MSD represents 0.1 mm, the vernier constant (in cm) is: *(2024)*

a. 100 N b. $10(N+1)$
c. $\frac{1}{10N}$ d. $\frac{1}{100(N+1)}$

63. A screw gauge gives the following readings when used to measure the diameter of a wire
Main scale reading: 0 mm
Circular scale reading: 52 divisions
Given that 1 mm on main scale corresponds to 100 divisions on the circular scale. The diameter of the wire from the above data is: *(2021)*

a. 0.026 cm b. 0.26 cm
c. 0.052 cm d. 0.52 cm

64. A screw gauge has least count of 0.01 mm and there are 50 divisions in its circular scale.
The pitch of the screw gauge is: *(2020)*

a. 0.25 mm b. 0.5 mm
c. 1.0 mm d. 0.01 mm

65. A student measured the diameter of a small steel ball using a screw gauge of least count 0.001 cm. The main scale reading is 5 mm and zero of circular scale division coincides with 25 divisions above the reference level. If screw gauge has a zero error of –0.004 cm, the correct diameter of the ball is [**MR**☆] *(2018)*

a. 0.053 cm b. 0.525 cm
c. 0.521 cm d. 0.529 cm

Answer Key

1. (d)	**2.** (a)	**3.** (c)	**4.** (b)	**5.** (c)	**6.** (c)	**7.** (d)	**8.** (b)	**9.** (d)	**10.** (d)
11. (c)	**12.** (c)	**13.** (c)	**14.** (d)	**15.** (d)	**16.** (c)	**17.** (d)	**18.** (c)	**19.** (b)	**20.** (b)
21. (a)	**22.** (b)	**23.** (c)	**24.** (b)	**25.** (a)	**26.** (d)	**27.** (d)	**28.** (c)	**29.** (a)	**30.** (a)
31. (d)	**32.** (a)	**33.** (d)	**34.** (c)	**35.** (b)	**36.** (b)	**37.** (d)	**38.** (c)	**39.** (a)	**40.** (a)
41. (c)	**42.** (d)	**43.** (b)	**44.** (c)	**45.** (d)	**46.** (a)	**47.** (d)	**48.** (d)	**49.** (c)	**50.** (b)
51. (b)	**52.** (b)	**53.** (c)	**54.** (a)	**55.** (d)	**56.** (a)	**57.** (b)	**58.** (c)	**59.** (a)	**60.** (a)
61. (b)	**62.** (d)	**63.** (c)	**64.** (b)	**65.** (d)					

Explanations

1. (d) 1 minute of arc $=1' = \left(\frac{1}{60}\right)^0 = \frac{1}{60}\times\frac{\pi}{180}$ radian

$= 2.91 \times 10^{-4}$ radian

2. (a) $K = \frac{Qx}{A(T_1 - T_2)t}$, where Q is the amount of heat flow, x is the thickness of the slab, A is the area of cross-section, and t is the time taken.

$$K = \frac{J\,m}{m^2\,Ks} = \frac{J}{s}\cdot\frac{m}{m^2}\cdot\frac{1}{K} = Wm^{-1}K^{-1}$$

3. (c) Let F = kv (k : constant of proportionality)

$$[k] = \left[\frac{F}{v}\right] = \left[\frac{MLT^{-2}}{LT^{-1}}\right] = [MT^{-1}]$$

Hence units of k is kgs^{-1}.

4. (b) $\because n_1u_1 = n_2u_2$

Where, n_1 and n_2 are numerical values u_1 and u_2 are units.

$$4\frac{g}{cm^3} = n_2\frac{100\,g}{(10\,cm)^3} \Rightarrow n_2 = 40$$

5. (c) $\because$ Unit of x = unit of bt^2

$\therefore$ Units of $b = \frac{x}{t^2} = \frac{km}{s^2} = km/s^2$

6. (c) Strain and angle are also dimensionless

Solid angle is dimensionless.

7. (d) $F = \alpha t^2 + \beta t$

$[MLT^{-2}] = \alpha\,[T^2]$

$\alpha = [MLT^{-4}]$

$[MLT^{-2}] = \beta\,[T]$

$\beta = [MLT^{-3}]$

$$\frac{\alpha t}{\beta} = \frac{[MLT^{-4}][T]}{[MLT^{-3}]} = [M^0L^0T^0]$$

8. (b) Plane angle and solid angle are dimensionless physical quantities but have units.

9. (d) $[MLT^{-2}A^{-2}]$ is the dimensional formula for Magnetic permeability

10. (d) For energy, the dimensional formula is $[ML^2\,T^{-2}]$

For gravitational constant, the dimensional formula is $[M^{-1}\,L^3\,T^{-2}]$

$$\therefore \frac{[E]}{[G]} = \frac{[M^1L^2T^{-2}]}{[M^{-1}L^3T^{-2}]} = [M^{1+1}\,L^{2-3}\,T^{-2+2}]$$

$$\Rightarrow \left[\frac{E}{G}\right] = [M^2\,L^{-1}\,T^0]$$

11. (c) Stress $= \frac{\text{Force}}{\text{Area}}$

Dimension of stress $= \frac{[M^1L^1T^{-2}]}{[L^2]}$

Dimension of stress = $[M^1L^{-1}T^{-2}]$

12. (c) Speed of light, $c = \frac{1}{\sqrt{\mu_0\varepsilon_0}} \Rightarrow [LT^{-1}]$

13. (c) $\left[\frac{1}{2}\varepsilon_0E^2\right]$ = Energy density

$\therefore$ Dimension $= \frac{[ML^2T^{-2}]}{[L^3]} = [ML^{-1}T^{-2}]$

14. (d) [Force] = $[MLT^{-2}]$; a = 1, b = 1, c = –2

[Pressure] = $[ML^{-1}T^{-2}]$; a = 1, b = –1, c = –2

[Velocity] = $[M^0LT^{-1}]$; a = 0, b = 1, c = –1

[Acceleration] = $[M^0LT^{-2}]$, a = 0, b = 1, c = –2

15. (d)

A. Energy density $= \left[\frac{\text{Energy}}{\text{Volume}}\right] = \left[\frac{ML^2T^{-2}}{L^3}\right]$

Energy density = $[ML^{-1}T^{-2}]$

B. [Refractive index] = $[M^0L^0T^0]$

C. [Dielectric constant] = $[M^0L^0T^0]$

D. Young's modulus $= \left[\frac{\text{Stress}}{\text{Strain}}\right] = [ML^{-1}T^{-2}]$

E. Magnetic field

$(B) = \left[\frac{F}{qv}\right] = [ML^0T^{-2}A^{-1}]$

So, [(A) and (D)] and [(B) and (C)] have same dimension

16. (c) We can find the resistance by $R = \frac{V}{I}$

$R = \frac{W}{q\times I}$ [$\because$ W = Work done, q = Charge]

$R = \frac{W}{It\times I}$ ($\because$ q = It)

$$[R] = \frac{[ML^2T^{-2}]}{[I^2T]} = [ML^2T^{-3}I^{-2}]$$

Note: In electrostatics, if you will remember the dimension of V (Potential difference) then, it will be easy to find the dimensions of other quantities.

$[V] = [ML^2T^{-2}I^{-1}]$

17. (d) $\because F = \frac{Gm_1m_2}{r^2}$

$$\therefore [G] = \left[\frac{Fr^2}{m^2}\right] = \frac{[MLT^{-2}L^2]}{[M^2]} = [M^{-1}L^3T^{-2}]$$

18. (c) Planck constant, $h = \frac{\text{Energy}}{\text{Frequency}}$

$$\therefore [h] = \frac{[ML^2T^{-2}]}{[T^{-1}]} = [ML^2T^{-1}]$$

Angular momentum = Moment of inertia × Angular velocity

L = I v

$\therefore [L] = [ML^2][T^{-1}] = [ML^2T^{-1}]$

Hence dimension of Plank's constant and angular momentum are same.

19. (b) Dimensions of force = $[MLT^{-2}]$

Dimensions of impulse = $[MLT^{-1}]$

So, dimension of force and impulse are not equal.

Whereas,

Dimension of energy and torque = $[ML^2T^{-2}]$

Dimension of angular momentum and plank's constant = $[ML^2T^{-1}]$

Dimension of elastic molecules and pressure = $[ML^{-1}T^{-2}]$

20. (b) Impulse = Force × Time

[Impulse] = [Force] × [Time]

= $[MLT^{-2}][T] = [MLT^{-1}]$

Linear momentum = Mass × velocity

[Linear momentum] = [Mass] × [velocity]

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

= $[MLT^{-1}]$

So, [Impulse] = [Linear momentum]

21. (a) L/R is known as the time constant of the LR series circuit, as its dimension is [T].

22. (b) Relative density, refractive index and Poisson ratio all the three are ratios, therefore they are dimensionless constants. Gravitational constant has dimension so it is dimensional constant.

23. (c) Units of RC = ohm × ohm^{-1} × second = second. Therefore dimensions of RC = Time.

24. (b) Pressure $= \frac{\text{Force}}{\text{Area}}$.

Therefore dimensions of pressure

$$= \frac{[MLT^{-2}]}{[L^2]} = [ML^{-1}T^{-2}]$$

25. (a) We know that,

$$\frac{F}{L} = \frac{\mu_0I_1I_2}{2\pi d} \Rightarrow \mu_0 = \frac{F.2\pi d}{I_1I_2L}$$

$$\therefore [\mu_0] = \frac{[F][d]}{[I_1][I_2][L]}$$

$$[\mu_0] = \frac{[MLT^{-2}][L]}{[A][A][L]} = [MLT^{-2}\,A^{-2}]$$

26. (d) Dimensions of force F = $[MLT^{-2}]$

Dimensions of velocity gradient

$$\frac{\Delta v}{\Delta Z} = \frac{[LT^{-1}]}{[L]} = [T^{-1}]$$

Dimensions of area A = $[L^2]$

Given $F = -\eta A\frac{\Delta v}{\Delta Z}$

Dimensional formula for coefficient of viscosity

$$[\eta] = \frac{[F]}{[A]\left[\frac{\Delta v}{\Delta Z}\right]} = \frac{[MLT^{-2}]}{[L^2][T^{-1}]} = [ML^{-1}T^{-1}]$$

27. (d) Dimensions of energy E = $[ML^2\,T^{-2}]$

Dimensions of volume V = $[L^3]$

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

Dimensions of area A = $[L^2]$

Dimensions of voltage V' = $[ML^2T^{-3}A^{-1}]$

Dimensions of charge q = [AT]

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