PRE-MEDICAL

PHYSICS

ENTHUSIAST | LEADER | ACHIEVER

EXERCISE

Physical world, Units, Dimensions and errors in measurement

ENGLISH MEDIUM

EXERCISE-I (Conceptual Questions) | Build Up Your Understanding

UNIT

1. Which of the following system of units is not based on units of mass, length and time alone ?
(1) SI   (2) MKS   (3) FPS   (4) CGS

UD0001

2. Which of the following quantity is unitless ?
(1) Velocity gradient   (2) Pressure gradient
(3) Displacement gradient (4) Force gradient

UD0002

3. The fundamental unit which has same power in the dimensional formula of surface tension and co-efficient of viscosity is
(1) Mass   (2) Length   (3) Time   (4) None

UD0003

4. The ratio of one micron to one nanometre is

(1) 10^3 (2) 10^{-3} (3) 10^{-6} (4) 10^{-1}

UD0004

5. Temperature can be expressed as a derived quantity in terms of which of the following ?
(1) Length and mass
(2) Mass and time
(3) Length. mass and time
(4) None of these

UD0005

6. Density of wood is 0.5 gm/cc in CGS system of units. The corresponding value in MKS units is
(1) 500   (2) 5   (3) 0.5   (4) 5000

UD0006

7. Match list I with list II and select the correct answer by using the codes given below the lists

List I (Item)	List II (Units of length)
A. Distance between earth and stars	1. Micron
B. Inter atomic distance in a solid	2. Angstrom
C. Size of nucleus	3. Light year
D. Wavelength of Infrared Laser	4. Fermi
	5. Kilometre

Codes

	A	B	C	D
(1)	5	4	2	1
(2)	3	2	4	1
(3)	5	2	4	3
(4)	3	4	1	2

UD0007

8. Which of the following is not the unit of time ?
(1) Micro second   (2) leap year
(3) Lunar month   (4) Parallactic second

UD0008

9. Which of the following is smallest unit
(1) Millimetre   (2) Angstrom
(3) Fermi   (4) Metre

UD0009

10. Which relation is wrong ?
(1) 1 cal = 4.18 joules
(2) 1 Å = 10^{-10} m
(3) 1 MeV = 1.6×10^{-13} joules
(4) 1 newton = 10^{-5} dynes

UD0010

11. 'Parsec' is the unit of –
(1) time
(2) distance
(3) frequency
(4) angular acceleration

UD0011

12. The ratio of the dimensions of Planck's constant and that of the moment of inertia is :-
(1) Velocity
(2) Angular momentum
(3) Time
(4) Frequency

UD0012

DIMENSIONS

13. When a wave travels in a medium, the displacement of a particle located at distance x at time t is given by $y = a \sin (bt - cx)$ where a, b and c are constants of the wave. The dimensions of b/c are same as that of :

(1) wave velocity   (2) wave length
(3) wave amplitude   (4) wave frequency

UD0013

14. The dimensional formula of wave number is

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

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

UD0014

15. The method of dimensional analysis can be used to derive which of the following relations ?

(1) $N_0 e^{-\lambda t}$ (2) $A \sin(\omega t + kx)$

(3) $\frac{1}{2} mv^2 + \frac{1}{2} I\omega^2$ (4) None of the above

UD0015

16. Which of the following does not have the dimensions of force ?

(1) Potential gradient

(2) Energy gradient

(3) Weight

(4) Rate of change of momentum

UD0016

17. Which of the following is incorrect statement

(1) A dimensionally correct equation may be correct

(2) A dimensionally correct equation may be incorrect

(3) A dimensionally incorrect equation may be correct

(4) A dimensionally incorrect equation is incorrect

UD0017

18. A dimensionless quantity

(1) Never has a unit   (2) Always has a unit

(3) May have a unit   (4) Does not exist

UD0018

19. A unitless quantity

(1) Does not exist

(2) Always has a nonzero dimension

(3) Never has a nonzero dimension

(4) May have a nonzero dimension

UD0019

20. Which of the following is incorrect ?

(1) All derived quantities may be represented dimensionally in terms of the base quantities

(2) A base quantity cannot be represented dimensionally in terms of other base quantities

(3) The dimension of a derived quantity is never zero in any base quantity

(4) The dimension of a base quantity in other base quantities is always zero.

UD0020

21. Two physical quantities of which one is a vector and the other is a scalar having the same dimensional formula are :

(1) Work and energy

(2) Torque and work

(3) Impulse and momentum

(4) Power and pressure

UD0021

22. The equation of a wave is given by $Y = A \sin \omega \left(\dfrac{x}{v} - k \right)$ where ω is the angular velocity and v is the linear velocity. The dimensions of k is

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

UD0022

23. The time dependence of a physical quantity P is given by $P = P_0 \exp(-\alpha t^2)$, where α is a constant and t is time. The constant α

(1) is dimensionless

(2) has dimensions [T^{-2}]

(3) has dimensions of P

(4) has dimensions [T^2]

UD0023

24. The dimensional formula of angular velocity is

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

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

UD0024

25. A force F is given by $F = at + bt^2$, where t is time. The dimensions of a and b are

(1) [M L T^{-3}] and [M L T^{-4}]

(2) [M L T^{-4}] and [M L T^{-3}]

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

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

UD0026

26. Which of the following pairs does not have similar dimensions?

(1) Tension and surface tension

(2) Stress and pressure

(3) Planck's constant and angular momentum

(4) Angle and strain

UD0029

27. The dimensions of torque are:

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

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

UD0030

28. Dimensions of relative density is

(1) kg m^{-3} (2) [ML^{-3}]

(3) dimensionless   (4) [M^2 L^{-6}]

UD0032

29. The dimensions of universal gravitational constant are :-

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

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

UD0033

30. If dimensions of A and B are different, then which of the following operation is valid ?

(1) $\dfrac{A}{B}$ (2) $e^{-A/B}$ (3) A–B (4) A+ B

UD0034

ERRORS

31. A quantity is represented by $X = M^a L^b T^c$. The percentage error in measurement of M, L and T are $\alpha\%$, $\beta\%$ and $\gamma\%$ respectively. The percentage error in X would be

(1) $(\alpha a + \beta b + \gamma c)\%$ (2) $(\alpha a - \beta b + \gamma c)\%$
(3) $(\alpha a - \beta b - \gamma c)\%$ (4) None of these

UD0035

32. An experiment measures quantities a, b and c, and X is calculated from $X = ab^2/c^3$. If the percentage error in a, b and c are $\pm1\%$, $\pm3\%$ and $\pm2\%$ respectively, the percentage error in X will be –

(1) $\pm13\%$ (2) $\pm7\%$
(3) $\pm4\%$ (4) $\pm1\%$

UD0036

33. Zero error of an instrument introduces

(1) Systematic errors (2 Random errors
(3) Both (4) None of these

UD0037

34. What is the fractional error in g calculated from $T = 2\pi\sqrt{\ell/g}$? Given that fractional errors in T and ℓ are $\pm x$ and $\pm y$ respectively.

(1) x + y (2) x – y (3) 2x + y (4) 2x – y

UD0038

35. A thin copper wire of length ℓ metre increases in length by 2% when heated through 10℃. What is the percentage increase in area when a square copper sheet of length ℓ metre is heated through 10℃ ?

(1) 4% (2) 8%
(3) 16% (4) None of these

UD0039

36. The resistance is $R = \dfrac{V}{I}$ where V = (100 ± 5) volt and I = (10 ± 0.2) ampere. What is the total error in R ?

(1) 5 % (2) 7 %
(3) 5.2 % (4) $\left(\dfrac{5}{2}\right)\%$

UD0040

37. If error in measuring diameter of a circle is 4 %, the error in circumference of the circle would be :-

(1) 2% (2) 8% (3) 4% (4) 1%

UD0041

38. The external and internal radius of a hollow cylinder are measured to be (4.23 ± 0.01) cm and (3.89 ± 0.01)cm. The thickness of the wall of the cylinder is :-

(1) (0.34 ± 0.02) cm (2) (0.17 ± 0.02) cm
(3) (0.17 ± 0.01) cm (4) (0.34 ± 0.01) cm

UD0042

39. Percentage error in measuring the radius and mass of a solid sphere are 2% & 1% respectively. Then error in measurement of moment of inertia about to its diameter is :-

(1) 3 % (2) 6 % (3) 5 % (4) 4 %

UD0043

40. The heat generated in a circuit is dependent upon the resistance, current and time for which the current is flown. If the error in measuring the above are as 1%, 2% and 1% the maximum error in measuring heat will be

(1) 2% (2) 3%
(3) 6% (4) 1%

UD0044

41. The percentage errors in the measurement of mass and speed are 2% and 3% respectively. How much will be the maximum error in the estimate of kinetic energy obtained by measuring mass and speed ?

(1) 11 % (2) 8 %
(3) 5 % (4) 1 %

UD0045

42. While measuring acceleration due to gravity by a simple pendulum a student makes a positive error of 1% in the length of the pendulum and a negative error of 3% in the value of the time period. His percentage error in the measurement of the value of g will be -

(1) 2 % (2) 4 %
(3) 7 % (4) 10 %

UD0046

43. The pressure on a square plate is measured by measuring the force on the plate and the length of the sides of the plate. If the maximum error in the measurement of force and length are respectively 4% and 2%, the maximum error in the measurement of pressure is –

(1) 1% (2) 2% (3) 6% (4) 8%

UD0047

44. The error in measuring the side of a cube is ±1%. The error in the calculation of the volume of the cube will be about

(1) ±0.001 %   (2) ± 1 %

(3) ±6 %   (4) ±3 %

UD0048

45. When a copper sphere is heated, maximum percentage change will be observed in–

(1) radius   (2) area

(3) volume   (4) none of these

UD0049

46. The resistance R of a wire is given by the relation $R = \dfrac{\rho\ell}{\pi r^2}$. Percentage error in the measurement of ρ, ℓ and r is 1%, 2 % and 3 % respectively. Then the percentage error in the measurement of R is

(1) 6%   (2) 9%

(3) 8%   (4) 10%

UD0050

47. Which of the following has the highest number of significant figures ?

(1) 0.007 m^2 (2) 2.64 × 10^{24} kg

(3) 0.0006032 m^2 (4) 6.3200 J

UD0051

48. A physical quantity X is given by X = $\dfrac{2k^3\ell^2}{m\sqrt{n}}$.

The percentage error in the measurements of k, ℓ, m and n are 1%, 2%, 3% and 4% respectively. The value of X is uncertain by

(1) 8 %   (2) 10 %   (3) 12 %   (4) None

UD0052

MEASUREMENT

49. In a vernier callipers, N divisions of vernier scale coincide with (N – 1) divisions of main scale (in which 1 division represents 1mm). The least count of the instrument in cm should be

(1) N   (2) N – 1

(3) $\dfrac{1}{10N}$ (4) $\dfrac{1}{N-1}$

UD0053

50. A vernier callipers has 20 divisions on the vernier scale which coincide with 19 divisions on the main scale. The least count of the instrument is 0.1 mm. The main scale divisions are of

(1) 0.5 mm   (2) 1 mm   (3) 2 mm   (4) 1/4 mm

UD0054

51. One centimetre on the main scale of vernier callipers is divided into ten equal parts. If 10 divisions of vernier scale coincide with 8 small divisions of the main scale, the least count of the callipers is

(1) 0.01 cm   (2) 0.02 cm

(3) 0.05 cm   (4) 0.005 cm

UD0055

52. A student measured the diameter of a wire using a screw gauge with least count 0.001 cm and listed the measurements. The correct measurement is –

(1) 5.3 cm   (2) 5.32 cm

(3) 5.320 cm   (4) 5.3200 cm

UD0056

EXERCISE-I (Conceptual Questions)   **ANSWER KEY**

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	1	3	1	1	4	1	2	4	3	4	2	4	1	3	4
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	1	3	3	3	3	2	2	2	1	1	1	3	3	4	1
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	1	1	1	3	1	2	3	1	3	3	2	3	4	4	3
Que.	46	47	48	49	50	51	52								
Ans.	2	4	3	3	3	2	3								

EXERCISE-II (Previous Year Questions)

AIPMT/NEET

AIPMT 2006

1. The velocity v of a particle at time t is given by

$v = at + \dfrac{b}{t+c}$, where a, b and c are constants.

The dimensions of a, b and c are respectively :-
(1) LT^{-2}, L and T
(2) L^2, T and LT^2
(3) LT^2, LT and L
(4) L, LT and T^2

UD0057

AIPMT 2007

2. Dimensions of electrical resistance is :–
(1) $[ML^2 T^{-3} A^{-1}]$
(2) $[ML^2 T^{-3} A^{-2}]$
(3) $[ML^3 T^{-3} A^{-2}]$
(4) $[ML^{-1} L^3 T^3 A^2]$

UD0059

AIPMT 2008

3. 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
(1) (a), (d)
(2) (a), (e)
(3) (b), (d)
(4) (c), (e)

UD0060

4. 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 :-
(1) 8%   (2) 2 %   (3) 4 %   (4) 6%

UD0061

AIPMT 2009

5. If the dimensions of a physical quantity are given by $M^a L^b T^c$, then the physical quantity will be :
(1) Force if a = 0, b = –1, c = – 2
(2) Pressure if a = 1, b = – 1, c = – 2
(3) Velocity if a = 1, b = 0, c = – 1
(4) Acceleration if a = 1, b = 1, c = – 2

UD0062

AIPMT (Pre) 2010

6. The dimensions of $\dfrac{1}{2} \in_0 E^2$, where $\in_0$ is permittivity of free space and E is electric field, is:-
(1) $[MLT^{-1}]$
(2) $[ML^2 T^{-2}]$
(3) $[ML^{-1}T^{-2}]$
(4) $[ML^2 T^{-1}]$

UD0063

AIPMT (Mains) 2010

7. A student measures the distance traversed in free fall of a body, initially at rest in a given time. He uses 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 :-
(1) $e_1 + 2e_2$
(2) $e_1 + e_2$
(3) $e_1 - 2e_2$
(4) $e_2 - e_1$

UD0064

AIPMT (Pre) 2011

8. The dimensions of $\left(\mu_0 \in_0\right)^{-1/2}$ are :-
(1) $[L^{\frac{1}{2}}T^{-\frac{1}{2}}]$
(2) $[L^{-1}T]$
(3) $[LT^{-1}]$
(4) $[L^{-\frac{1}{2}}T^{\frac{1}{2}}]$

UD0066

AIPMT (Mains) 2011

9. The density of a material in CGS system of units is 4 g/cm³. 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 :-
(1) 0.04   (2) 0.4   (3) 40   (4) 400

UD0067

AIPMT (Pre) 2012

10. If voltage across a bulb rated 220 Volt 100 Watt drops by 2.5% of its rated value, the percentage of the rated value by which the power would decrease is :-
(1) 5%   (2) 10%   (3) 20%   (4) 2.5%

UD0069

NEET-UG 2013

11. In an experiment four quantities a, b, c and d are measured with percentage errors 1%, 2%, 3% and 4% respectively. Quantity P is calculated as follows $P = \dfrac{a^3 b^2}{cd}$, percentage error in P is :-
(1) 4%   (2) 14%   (3) 10%   (4) 7%

UD0071

AIPMT 2014

12. If force (F), velocity (V) and time (T) are taken as fundamental units, then the dimensions of mass are:
(1) $[F V T^{-1}]$
(2) $[F V T^{-2}]$
(3) $[F V^{-1} T^{-1}]$
(4) $[F V^{-1} T]$

UD0073

AIPMT 2015

13. If energy (E), velocity (V) and time (T) are chosen as the fundamental quantities, the dimensional formula of surface tension will be :

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

(3) $[E^{-2}V^{-1}T^{-3}]$ (4) $[EV^{-2}T^{-1}]$

UD0074

Re-AIPMT 2015

14. If dimension of critical velocity v_c, of liquid flowing through a tube is expressed as (η^x ρ^y r^z), where η, ρ and r 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 :

(1) 1, 1, 1 (2) 1, –1, –1

(3) –1, –1, 1 (4) –1, –1, –1

UD0075

NEET-II 2016

15. 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?

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

UD0078

NEET(UG) 2017

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

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

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

UD0081

NEET(UG) 2018

17. 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 :-

(1) 0.521 cm (2) 0.525 cm

(3) 0.053 cm (4) 0.529 cm

UD0082

NEET(UG) 2019

18. In an experiment, the percentage of error occurred in the measurment of physical quantities A, B, C and D are 1%, 2%, 3% and 4% respectively. Then the maximum percentage of error in the measurement X, where $X = \dfrac{A^2 B^{1/2}}{C^{1/3} D^3}$, will be :

(1) $\left(\dfrac{3}{13} \right)$% (2) 16%

(3) –10% (4) 10%

UD0111

19. The unit of thermal conductivity is :

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

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

UD0112

NEET(UG) 2019 (Odisha)

20. The main scale of a vernier calliper has n divisions/cm. n divisions of the vernier scale coincide with (n – 1) divisions of main scale. The least count of the vernier calliper is,

(1) $\dfrac{1}{(n+1)(n-1)}$ cm

(2) $\dfrac{1}{n}$ cm

(3) $\dfrac{1}{n^2}$ cm

(4) $\dfrac{1}{n(n+1)}$ cm

UD0113

NEET(UG) 2020

21. Taking into account of the significant figures, what is the value of 9.99 m – 0.0099 m ?

(1) 9.9 m (2) 9.9801 m

(3) 9.98 m (4) 9.980 m

UD0114

22. Dimensions of stress are :

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

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

UD0115

23. 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 :

(1) 1.0 mm (2) 0.01 mm

(3) 0.25 mm (4) 0.5 mm

UD0116

NEET(UG) 2020 (COVID-19)

24. The angle of 1' (minute of arc) in radian is nearly equal to

(1) 2.91×10^{-4} rad

(2) 4.85×10^{-4} rad

(3) 4.80×10^{-6} rad

(4) 1.75×10^{-2} rad

UD0117

25. Time intervals measured by a clock give 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 of the observations ?

(1) 2 %   (2) 4 %   (3) 16 %   (4) 1.6 %

UD0118

NEET(UG) 2021

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

(1) [F] [A] [T]   (2) [F] [A] [T^2]

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

UD0119

27. 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 :

(1) 0.52 cm   (2) 0.026 cm

(3) 0.26 cm   (4) 0.052 cm

UD0120

28. If E and G respectively denote energy and gravitational constant, then $\dfrac{E}{G}$ has the dimensions of :

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

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

UD0121

NEET(UG) 2021 (Paper-2)

29. The dimensions of mobility of electrons are

(1) M^{-1}LA^2

(2) MT^{-2}A^{-1}

(3) M^{-1}T^{2}A

(4) M^{-1}T^{2}A^{-1}

UD0122

NEET(UG) 2022

30. Plane angle and solid angle have :

(1) Dimensions but no units

(2) No units and no dimensions

(3) Both units and dimensions

(4) Units but no dimensions

UD0123

31. The dimensions [MLT^{-2} A^{-2}] belong to the :

(1) self inductance

(2) magnetic permeability

(3) electric permittivity

(4) magnetic flux

UD0124

32. 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 :

(1) 1382   (2) 1382.5

(3) 14×10^2 (4) 138×10^1

UD0125

33. Match **List - I** with **List - II** :

	List - I		List – II
(a)	Gravitational constant (G)	(i)	[L^{2}T^{-2}]
(b)	Gravitational potential energy	(ii)	[M^{-1}L^{3}T^{-2}]
(c)	Gravitational potential	(iii)	[LT^{-2}]
(d)	Gravitational intensity	(iv)	[ML^{2}T^{-2}]

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

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

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

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

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

UD0126

NEET(UG) 2022 (Overseas)

34. The dimensions of mutual inductance (M) are:

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

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

UD0127

35. When the circular scale of a screw gauge completes 2 rotations, it covers 1 mm over the pitch scale. The total number of the circular scale divisions is 50. The least count of the screw gauge in metre is:

(1) 10^{-5} (2) 10^{-2} (3) 10^{-3} (4) 10^{-4}

UD0128

36. The determination of the value of acceleration due to gravity (g) by simple pendulum method employs the formula,

$$g = 4\pi^2 \frac{L}{T^2}$$

The expression for the relative error in the value of 'g' is:

(1) $\dfrac{\Delta g}{g} = 4\pi^2\left[\dfrac{\Delta L}{L} - 2\dfrac{\Delta T}{T}\right]$

(2) $\dfrac{\Delta g}{g} = 4\pi^2\left[\dfrac{\Delta L}{L} + 2\dfrac{\Delta T}{T}\right]$

(3) $\dfrac{\Delta g}{g} = \dfrac{\Delta L}{L} - 2\dfrac{\Delta T}{T}$

(4) $\dfrac{\Delta g}{g} = \dfrac{\Delta L}{L} + 2\dfrac{\Delta T}{T}$

UD0129

Re-NEET(UG) 2022

37. The physical quantity that has the same dimensional formula as pressure is :

(1) Force

(2) Momentum

(3) Young's modulus of elasticity

(4) Coefficient of viscosity

UD0130

38. The percentage error in the measurement of g is:

(Given that $g = \dfrac{4\pi^2 L}{T^2}$, L = (10 ± 0.1) cm,

T = (100 ± 1) s)

(1) 2%   (2) 5%

(3) 3%   (4) 7%

UD0131

EXERCISE-II (Previous Year Questions)   ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	1	2	1	4	2	3	1	3	3	1	2	4	2	2	3
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	4	4	2	4	3	3	1	4	1	4	2	4	1	3	4
Que.	31	32	33	34	35	36	37	38							
Ans.	2	3	1	3	1	4	3	3							

EXERCISE-III (Analytical Questions)　　　Master Your Understanding

1. In a particular system the units of length mass and time are chosen to be 10 cm, 10 g and 0.1 s respectively. The unit of force in this system will be equal to

(1) 0.1 N　(2) 1 N　(3) 10 N　(4) 100 N

UD0083

2. The period of oscillation of a simple pendulum in an experiment is recorded as 2.63s, 2.56s, 2.42s, 2.71s and 2.80s respectively. The average absolute error is

(1) 0.1s　(2) 0.11s　(3) 0.01s　(4) 1.0s

UD0085

3. The length, breadth and thickness of a strip are

(10.0±0.1) cm

(1.00±0.01) cm and

(0.100± 0.001) cm

respectively. The most probable error in its volume will be

(1) ± 0.03 cm^3　　(2) ± 0.111 cm^3

(3) ± 0.012 cm^3　　(4) None of these

UD0086

4. The length of a cylinder is measured with a metre rod having least count 0.1 cm. Its diameter is measured with vernier callipers having least count 0.01 cm. Given the length is 5.0 cm. and radius is 2.00 cm. The percentage error in the calculated value of volume will be –

(1) 2%　　　　(2) 1%

(3) 3%　　　　(4) 4%

UD0087

5. If energy (E), velocity (V) and time (T) were chosen as fundamental physical quantities for measurement, then the dimensional formula for mass will be :-

(1) [E^1 V^2 T^1]　　(2) [E^2 V^{-2} T^0]

(3) [E^1 V^{-2} T^0]　　(4) [E^{-1} V^2 T^1]

UD0089

6. Which of the following does not have the same unit as others ?

(1) watt-s　　　　(2) kilowatt-hour

(3) eV　　　　　(4) J-s

UD0092

7. Suppose refractive index μ is given as μ = A + B/λ^2, were A and B are constants and λ is wavelength then the dimension of B are same as that of **:-**

(1) wavelength　　(2) pressure

(3) area　　　　(4) volume

UD0093

8. The dimensional formula for Planck's constant h and gravitational constant G respectively are :-

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

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

UD0095

9. A wire has a mass (0.3 ± 0.003) g, radius (0.5 ± 0.005) mm and length (6 ± 0.06) cm. The maximum percentage error in the measurement of its density is–

(1) 1　　(2) 2　　(3) 3　　(4) 4

UD0100

10. In a vernier callipers, one main scale division is x cm and n divisions of the vernier scale coincide with (n −1) divisions of the main scale. The least count (in cm) of the callipers is :-

(1) $\left(\dfrac{n-1}{n}\right)x$　(2) $\dfrac{nx}{(n-1)}$　(3) $\dfrac{x}{n}$　(4) $\dfrac{x}{(n-1)}$

UD0101

11. Choose the incorrect statement out of the following :-

(1) Every measurement made by any measuring instrument has some error.

(2) Every calculated physical quantity that is based on measured values has some error.

(3) A measurement can have more accuracy but less precision and vice versa.

(4) The percentage error is different from relative error.

UD0102

EXERCISE-III (Analytical Questions)　　　ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11
Ans.	1	2	1	3	3	4	3	2	4	3	4