PHYSICS

BOOKS - DC PANDEY ENGLISH

UNITS, DIMENSIONS & ERROR ANALYSIS

Examples

1. The acceleration due to gravity is $9.8ms^{-2}$. Give its value in ft s^{-2}

Watch Video Solution

2. If the value of universal gravitational constant is $6.67 \times 10^{-11} Nm^2 kg^{-2}$, then find its value in CGS system.

Watch Video Solution

3. The wavelength of a light is of the order of 6400Å. Express this in micron and metre.

Watch Video Solution

4. How many microns are there in 1 light year ?

Watch Video Solution

5. How many microseconds are there in 10 minutes?

Watch Video Solution

6. Calculate the angle of

(i) 1° (degree)

(ii) 1° (minute of arc or arc minute) and

(iii) 1° (second of arc or arc sec)

in radian.(Use $360^\circ = 2\pi rad, 1^\circ = 60^\circ$ and $1' = 60^\circ$ and $1' = 60'')$

Watch Video Solution

7. Find the dimensional formula of

(a) coefficient of viscosity η (b)charge q

(c) potention V (d) capacitance C and

(e) resistance R

Some of the equations containing these quantities are

$$F = -\eta A\left[\frac{\Delta v}{\Delta l}\right], q = It. U = VIt, q = CV \text{ and } V = IR$$

where A denotes the area, v the velocity , l is the length ,I the electric current, t the time and U the energy .

Watch Video Solution

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

Watch Video Solution

9. If C and R denote capacitance and resistance respectively, then the dimensional formula of CR is

Watch Video Solution

10. For which of the following quantities does ratios are dimensionless?

(i) $\frac{\text{work}}{\text{Energy}}$ (ii) $\sin\theta$ (iii) $\frac{Momentum}{Time}$

Watch Video Solution

11. In the formula $X = 3YZ^2$, X and Z have dimensions of capacitance and magnetic induction respectively. The dimensions of Y in MKSQ system are ....., ...

Watch Video Solution

12. Show that the expression of the time period T of a simple pendulum of length l given by $T = 2\pi\sqrt{\frac{l}{g}}$ is dimensionally correct

Watch Video Solution

13. Check the correctness of following equation by the method of dimensions :

$S = ut + \frac{1}{2}at^2$.

where S is the distance covered bu a body in time t, having initial velocity u and acceleration a.

Watch Video Solution

14. Write the dimensions of a and b in the relation , $P = \frac{b - x^2}{at}$, where P is power ,x is distance and t is time

Watch Video Solution

15. The velocity v of a particle depends upon time t, according to the equation $v = a + bt + \frac{c}{d+t}$ Write the dimensions of a,b,c, and d.

Watch Video Solution

16. The following equation gives a relation between the mass m_1 kept on a surface of area A, and the pressure P exerted on this area,

$$P = \frac{(m_1 + m_2)x}{A}$$

What must be the dimensions of the quantities x and m_2 ?

Watch Video Solution

17. Find the value 15 joule in a system which has 10 cm, 100 gm and 20sec as a fundamental units?

Watch Video Solution

18. The value of gravitation is $G = 6.67 \times 10^{-11} N - \frac{m^2}{kg^2}$ in SI units . Convert it into CGS system of units .

Watch Video Solution

19. The frequency (f) of a stretched string depends upon the tension F (dimensions of form) of the string and the

mass per unit length μ of string .Derive the formula for frequency

Watch Video Solution

20. The centripetal force F acting on a particle moving uniformly in a circle may depend upon mass (m), velocity (v) and radius (r) of the circle . Derive the formula for F using the method of dimensions.

Watch Video Solution

21. How many significant figures are there in the measured values

(i)227.2 g , (ii)3600 g and (iii)0.00602 g

A. 227.2 g

B. 3600 g

C. 0.00602 g

D. $2.50 \times 10^{10} g$

Answer:

Watch Video Solution

22. Add $6.75 \times 10^3 cm \rightarrow 4.52 \times 10^2 cm.$

Watch Video Solution

23. Two sticks of lengths 12.132 cm and 10.2 cm are placed end to end. Find their total length with due regard to decimal places.

Watch Video Solution

24. A thin wire has length of 21.7 cm and radius 0.46 mm. Calculate the volume of the wire to correct significant figures?

Watch Video Solution

25. The time taken by a pendulum to complete 25 vibrations is 88.0 s. Find the time period of the pendulum

in second upto appropriate significant figures.

Watch Video Solution

26. The voltage across a lamp, is 6.32V when the current passing through it is 3.4 A. Find the power consumed to appropriate significant figures.

Watch Video Solution

27. A substance having mass 5.74 g occupies a volume of $1.2cm^3$. Caluclate its density with due regard to significant digits.

Watch Video Solution

28. Round off the following numbers upto three significant figures

A. 2.520

B. 4.645

C. 22.78

D. 36.35

Answer:

Watch Video Solution

29. The length and the radius of a cylinder measured with a slide cllipers re found to be 4.54 cm and 1.75 cm respectively. Calculate the volume of the cylinder.

Watch Video Solution

30. What is the order of magnitude of the distance of the sun from the earth in SI unit?

Watch Video Solution

31. The length of a rod as measured in an experiment was found to be 2.48m, 2.46 m, 2.49 m, 2.50 m and 2.48m. Find

the average length, absolute error in each observation and the percentage error.

Watch Video Solution

32. The diameter of a wire as measured by screw gauge was found to be 2.620, 2.625, 2.630, 2.628 and 2.626 cm. Calculate

(a) mean value of diameter (b) absolute error in each measurement

(c) mean absolute error (d) fractional error

(e) percentage error (f) Express the result in terms of percentage error

Watch Video Solution

33. The refractive index (n) of glass is found to have the values 1.49,1.50,1.52,1.54 and 1.48. Calculate

(i) the mean value of refractive index,

(ii) absolute error in each measurement,

(iii) mean absolute error,

(iv) fractional error and

(v) percentage error

Watch Video Solution

34. The volumes of two bodies are measured to be $V_1 = (10.2 \pm 0.02)cm^3$ and $V_2 = (6.4 \pm 0.01)cm^3$. Calculate sum and difference in volumes with error limits.

Watch Video Solution

35. Calculate focal length of a spherical mirror from the following observations : object distance, $u = (50.1 \pm 0.5)cm$ and image distance , $v = (20.1 \pm 0.2)cm.$

Watch Video Solution

36. The radius of a sphere is measured to be (2.1 ± 0.5) cm. Calculate its surface area with error limits .

Watch Video Solution

37. The mass and density of a solid sphere are measured to be $(12.4 \pm 0.1)kg$ and $(4.6 \pm 0.2)kg/m^3$. Calculate the volume of the sphere with error limits .

Watch Video Solution

38. A thin copper wire of length L increase in length by 2 % when heated from T_1 to T_2. If a copper cube having side 10 L is heated from T_1 to T_2 when will be the percentage change in

(i) area of one face of the cube

(ii) volume of the cube

Watch Video Solution

39. Calculate percentage error in determination of time period of a pendulum.

$$T = 2\pi\sqrt{\frac{l}{g}}$$

where, l and g are measured with $\pm 1\,\%$ and $\pm 2\,\%$.

Watch Video Solution

40. Find the relative error in Z, if $Z = A^4 B^{1/3} / CD^{3/2}$ and the percentage error in the measurements of A,B,C and D are 4%,2%,3% and 1% respectively.

Watch Video Solution

Check Point 1 1

1. The SI unit of temperature is :

A. degress centigrade

B. kelvin

C. degree celsius

D. degress Fahrenheit

Answer: B

Watch Video Solution

2. The dimensions of surface tension are

A. $\left[M^2L^2T^2\right]$

B. $\left[M^2LT^2\right]$

C. $\left[MT^{-2}\right]$

D. $\left[MLT^2\right]$

Answer: C

Watch Video Solution

3. The dimensions of linear impulse are equal to that of

A. Force

B. linear momentum

C. Pressure

D. angular momentum

Answer: B

Watch Video Solution

4. Which of the following is not equal to watt?

A. joule/second

B. $ampere \times volt$

C. $(ampere)^2 \times ohm$

D. $ampere / volt$

Answer: D

Watch Video Solution

5. Which of the following does not posses the same dimensions as pressure ?

A. Stress

B. Bulk modulus

C. Thrust

D. Energy density

Answer: C

Watch Video Solution

6. Give the dimensional formula of (i) gravitational constnat (ii) coefficient of viscosity η.

A. $[ML^2T^2]$

B. $[ML^{-1}T^{-1}]$

C. $[M^{-1}L^3T^{-2}]$

D. None of these

Answer: C

Watch Video Solution

7. If C and R denote capacitance and resistance respectively, then the dimensional formula of CR is

A. $[M^0L^0T]$

B. $[ML^0T]$

C. $\left[M^0L^0T^2\right]$

D. not expressible in terms of M,L and T

Answer: A

Watch Video Solution

8. Which one of the following have same dimensions :

A. Torque and force

B. Potential energy and force

C. Torgue and potential energy

D. Planck's constant and linear momentum.

Answer: C

Watch Video Solution

9. Which of the following is a dimensional constant?

A. Poission's ratio

B. Refractive index

C. Relative density

D. Gravitational constant

Answer: D

Watch Video Solution

10. The force F on a sphere of radius r moving in a medium with velocity v is given by $F = 6\pi\eta rv$. The dimensions of η are

A. $\left[ML^{-3}\right]$

B. $\left[MLT^{-2}\right]$

C. $\left[MT^{-1}\right]$

D. $\left[ML^{-1}T^{-1}\right]$

Answer: D

Watch Video Solution

11. Density of a liquid in CGS system is $0.625 g / cm^3$. What is its magnitude in SI system ?

A. 0.625

B. 0.0625

C. 0.00625

D. 625

Answer: D

Watch Video Solution

12. Joule x second is the unit of

A. Energy

B. momentum

C. angular momentum

D. power

Answer: C

Watch Video Solution

13. $\left[ML^2T^{-3}A^{-1}\right]$ is the dimensional formula for

A. Capacitance

B. Resistance

C. Resistivity

D. Potential difference

Answer: D

Watch Video Solution

14. The dimensional formula fo resistivity in terms of M, L, T and Q where Q stands for the dimensions of charge is

A. $\left[ML^3T^{-1}Q^{-2}\right]$

B. $\left[ML^2T^{-2}Q^2\right]$

C. $\left[MLT^{-2}Q^{-2}\right]$

D. $\left[ML^2T^{-2}Q^{-1}\right]$

Answer: A

Watch Video Solution

15. the dimensional formula for planck's constant and angular momentum are

A. $\left[ML^2T^{-2}\right]$ and $\left[MLT^{-1}\right]$

B. $\left[ML^2T^{-1}\right.$ and $\left[ML^2T^{-1}\right]$

C. $\left[ML^3T^{-1}\right]$ and $\left[ML^2T^{-2}\right]$

D. $\left[MLT^{-1}\right]$ and $\left[MLT^{-2}\right]$

Answer: B

Watch Video Solution

16. Which of the following pairs have the same dimensions?

A. Wavelength and Rydberg constant

B. Relative velocity and relative density

C. Thermal capacity and Boltzmann constant

D. Time period and acceleration gradient

Answer: B

Watch Video Solution

17. Which one of the following is not the dimensionless quantity?

A. Plank's constant

B. Dielectric constant

C. Solid engle

D. Strain

Answer: A

Watch Video Solution

18. Given that $y = a\cos\left(\frac{t}{P} - qx\right)$, where t represents distance is metre. Which of the following statements is

true ?

A. The unit of x is same as that of q

B. The unit of x is same as that of p

C. The unit of t is ame as that of q

D. The unit of t is ame as that of p

Answer: D

Watch Video Solution

19. The dimensions of $\frac{a}{b}$ in the equation $P = \frac{a - t^2}{bx}$ where P is pressure, x is distance and t is time are

A. $\left[M^2 L^T \hat{} (-3)\right]$

B. $\left[MT^{-2}\right]$

C. $\left[LT^{-3}\right]$

D. $\left[ML^3T^{-1}\right]$

Answer: B

Watch Video Solution

20. The equation of a wave is given by

$$y = a\sin\omega\left[\frac{x}{v} - k\right]$$

where ω is angular velocity and v is the linear velocity .

The dimensions of k will be

A. $\left[T^{-2}\right]$

B. $\left[T^{-}\right]$

C. [T]

D. [LT]

Answer: C

Watch Video Solution

21. If 'muscle times speed equals power', then what is the ratio of the SI unit and the CGS unit of muscle?

A. 10^5

B. 10^3

C. 10^7

D. 10^{-5}

Answer: A

Watch Video Solution

22. The dimensions of $\frac{1}{2} \in_0 E^2$ ($\in_0$: permittivity of free space, E: electric field) is-

A. $\left[ML^2T^{-1}\right]$

B. $\left[ML^{-1}T^{-2}\right]$

C. $\left[ML^2T^2\right]$

D. [MLT^(-1)]`

Answer: B

Watch Video Solution

23. If P represents radiation pressure , C represents the speed of light , and Q represents radiation energy striking a unit area per second , then non - zero integers x, y, z such that $P^x Q^y C^z$ is dimensionless , find the values of $x, y,$ and z.

A. $x = 1, y = 1, z = -1$

B. $x = 1, y = -1, z = 1$

C. $x = -1, y = 1, z = 1$

D. $x = 1, y = 1, z = 1$

Answer: B

Watch Video Solution

24. The units of length, velocity and force are doubled. Which of the following is the correct change in th other units?

A. Unit of time is doubled

B. Unit of mass is doubled

C. Unit of momentum is doubled

D. Unit of energy is doubled

Answer: C

Watch Video Solution

25. Assuming that the mass m of the largest stone that can be moved by a flowing river depends upon the velocity v, of water, its density ρ and acceleration due to gravity g, then m is directly proportional to

A. v^3

B. v^4

C. v^5

D. v^6

Answer: D

Watch Video Solution

Check Point 1 2

1. What is the number of significant figures in 0.0310×10^3?

A. 2

B. 3

C. 4

D. 6

Answer: B

Watch Video Solution

2. The number of significant figures in 11.118×10^{-6} V is

A. 3

B. 4

C. 5

D. 6

Answer: C

Watch Video Solution

3. In which of the following numerical values, all zeros are significant?

A. 0.2020

B. 20.2

C. 2020

D. None of these

Answer: B

Watch Video Solution

4. What is the number of significant figure in (3.20 + 4.80) $\times 10^5$?

A. 5

B. 4

C. 3

D. 2

Answer: C

Watch Video Solution

5. Subtract 0.2 J from 7.26 and express the result with correct number of significant figures

A. 7.1

B. 7.06

C. 7

D. None of these

Answer: C

Watch Video Solution

6. The length , breadth , and thickness of a metal sheet are $4.234m, 1.005m,$ and $2.01cm$, respectively. Give the area and volume of the sheet to the correct number of significant figures.

A. $0.0855\mathrm{m}^3$

B. $0.086\mathrm{m}^3$

C. $0.08556\mathrm{m}^3$

D. $0.08\mathrm{m}^3$

Answer: A

Watch Video Solution

7. Multiply 107.88 by 0.610 and express the result with correct number of significant figures.

A. 65.8068

B. 64.807

C. 65.81

D. 65.8

Answer: D

Watch Video Solution

8. The radius of a thin wire is $0.16mm$. The area of cross section taking significant figures into consideration in

square millimeter is

A. 0.08

B. 0.080

C. 0.0804

D. 0.080384

Answer: B

Watch Video Solution

9. What is the value of $\left(5.0 \times 10^{-6}\right)\left(5.0 \times 10^{-8}\right)$ with due regards to significant figures ?

A. 25×10^{-14}

B. 25.0×10^{-14}

C. 2.50×10^{-13}

D. 250×10^{-15}

Answer: A

Watch Video Solution

10. If 97.52 is divided by 2.54, the correct result in terms of significant figures is

A. 38.3937

B. 38.394

C. 65.81

D. 38.4

Answer: D

Watch Video Solution

Check Point 1 3

1. If error in measuring diameter of a circle is 4 %, the error in the radius of the circle would be

A. 0.02

B. 0.08

C. 0.04

D. 0.01

Answer: C

Watch Video Solution

2. 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 1%, 2% and 1% respectively, then maximum error in measuring the heat is

A. 0.08

B. 0.06

C. 0.18

D. 0.12

Answer: B

Watch Video Solution

3. A force F is applied on a square plate of side L. If the percentage error in the determination of L is 2% and that in F is 4%. What is the permissible error in pressure?

A. 0.08

B. 0.06

C. 0.04

D. 0.02

Answer: A

Watch Video Solution

4. A cuboid has volume $V = l \times 2l \times 3l$, where l is the length of one side. If the relative percentage error in the measurment of l is 1%, then the relative percentage error in measurement of V is

A. 0.18

B. 0.06

C. 0.03

D. 0.01

Answer: C

Watch Video Solution

5. The length of a rod is $(11.05 \pm 0.05)cm$. What is the length of two such rods?

A. (22.1 ± 0.05) cm

B. (22.1 ± 0.1) cm

C. (22.10 ± 0.05) cm

D. (22.10 ± 0.2) cm

Answer: D

Watch Video Solution

6. Three measurements are made as 18.425 cm, 7.21 cm and 5.00 cm. The addition should be written as

A. 30.635 cm

B. 30.64 cm

C. 30.63 cm

D. 30.6 cm

Answer: D

Watch Video Solution

7. If the error in the measurement of momentum of a particle is (+ 100%), then the error in the measurement of kinetic energy is

A. 1

B. 2

C. 3

D. 4

Answer: C

Watch Video Solution

8. A body travels uniformly a distance of (13.8 ± 0.2)m in a time (4.0 ± 0.3). Its velocity with error limits is

A. $(3.45 \pm 0.2)\ \ \mathrm{ms}^{-1}$

B. $(3.45 \pm 0.3)\ \ \mathrm{ms}^{-1}$

C. $(3.45 \pm 0.4)\ \ \mathrm{ms}^{-1}$

D. $(3.45 \pm 0.5)\ \ \mathrm{ms}^{-1}$

Answer: B

Watch Video Solution

9. The radius of a ball is (5.2 ± 0.2) cm. The percentage error in the volume of the ball is (approximately).

A. 0.11

B. 0.04

C. 0.07

D. 0.09

Answer: A

Watch Video Solution

10. The value of two resistors are $(5.0 \pm 0.2)k\Omega$ and $(10.0 \pm 0.1)k\Omega$. What is the percentage error in the equivalent resistance when they are connected in parallel?

A. 0.02

B. 0.05

C. 0.07

D. 0.1

Answer: B

Watch Video Solution

Chapter Exercises Taking It Together

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

A. $\frac{A}{B}$

B. $e^{-A/B}$

C. A-B

D. A+B

Answer: A

Watch Video Solution

2. The diameter of a wire is measured to be 0.0250×10^{-4} m. The number of significant figures in the measurement is

A. five

B. four

C. three

D. nine

Answer: C

Watch Video Solution

3. Dimensional formula for electromotive force is same as that for

A. potential

B. current

C. force

D. energy

Answer: A

Watch Video Solution

4. The number of significant figures in 0.06900 is

A. 5

B. 4

C. 2

D. 3

Answer: B

Watch Video Solution

Watch Video Solution

5. The sum of the numbers 436.32, 227.2 and 0.301 in appropriate significant figures is

A. 663.821

B. 664

C. 663.8

D. 663.82

Answer: C

Watch Video Solution

6. The dimensional formula for magnetic flux is

A. $\left[ML^2T^{-2}A^{-1}\right]$

B. $\left[ML^3T^{-2}A^{-2}\right]$

C. $\left[M^0L^{-2}T^{-2}A^{-2}\right]$

D. $\left[ML^2T^{-1}A^2\right]$

Answer: A

Watch Video Solution

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

A. $\left[MLT^{-3}\right]$ and $\left[MLT^{-4}\right]$

B. $\left[MLT^{-4}\right]$ and $\left[MLT^{-3}\right.$

C. $\left[\mathrm{MLT}^{-1}\right]$ and $\left[\mathrm{MLT}^{-2}\right]$

D. $\left[\mathrm{MLT}^{-2}\right]$ and $\left[\mathrm{MLT}^{0}\right]$

Answer: A

Watch Video Solution

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

A. force, if $a = 0, b = -1, c = -2$

B. pressure if $a = 1, b = -1, c = -2$

C. velocity if $a = 1, b = 0, c = -1$

D. acceleration if $a = 1, b = 1, c = -2$

Answer: B

Watch Video Solution

9. Three measurements are made as 18.425 cm, 7.21 cm and 5.0 cm. The addition should be written as

A. 30.635 cm

B. 30.64 cm

C. 30.63 cm

D. 30.6 cm

Answer: D

Watch Video Solution

10. What are the units of $K\frac{1}{4\pi \in_0}$?

A. $C^2N^{-1}m^{-2}$

B. Nm^2C^{-2}

C. Nm^2C^2

D. Unitless

Answer: B

Watch Video Solution

11. The radius of a circle is 21.2 m. Its area according to the rule of significant figures is

A. 14.1124 m^2

B. 14.112 m^2

C. 14.11 m^2

D. 14.1 m^2

Answer: D

Watch Video Solution

12. If the value of resistance is 10.845 ohm and the value of current is 3.23 amp, the value of potential with significant numbers would be

A. 35.0 V

B. 3.50 V

C. 35.029 V

D. 35.030 V

Answer: A

Watch Video Solution

13. The position of the particle moving along Y-axis is given as $y = At^2 - Bt^3$, where y is measured in metre and t in second. Then, the dimensions of B are

A. $\left[\mathrm{LT}^{-2}\right]$

B. $\left[\mathrm{LT}^{-1}\right]$

C. $\left[LT^{-3}\right]$

D. $\left[MLT^{-2}\right]$

Answer: C

Watch Video Solution

14. The length, breadth and thickness of a block are given by l=12 cm , b=6cm and t=2.45 cm. The volume of the block according to the idea of significant figures should be

A. $1 \times 10^2 \quad cm^3$

B. $2 \times 10^2 \quad cm^3$

C. $1.764 \times 10^2 \quad cm^3$

D. None of these

Answer: B

Watch Video Solution

15. Out of following four dimensional quantities, which one quantity is to be called a dimensional constant

A. Acceleration due to gravity

B. Surface tension of water

C. Weight of a standaard kilogram mass

D. The velocity of light in vaccum

Answer: D

Watch Video Solution

16. If interference is complete or cent percent then the frequency of observed crossover will be

A. 4x

B. $\frac{1}{4}x$

C. 2x

D. $\frac{1}{2}x$

Answer: B

Watch Video Solution

17. A physical quantity x is calculated from the relation $x = \frac{a^2 b^3}{c\sqrt{d}}$. If the percentage error in $a, b, c,$ and $dare 2\,\%, 1\,\%, 3\,\%,$ and $4\,\%,$ respectively, what is the percentage error in x?

A. $\pm 8\,\%$

B. $\pm 10\,\%$

C. $\pm 14\,\%$

D. $\pm 12\,\%$

Answer: C

Watch Video Solution

18. With usual notation, the following equation, said to give the distance covered in the $n\text{th}$ second. $i.e.$, S_(n)=u+$\left(a\frac{2n-1}{2}\right)$ `is

A. only numerically correct

B. only dimensionally correct

C. Both dimensionally and numerically

D. Neither numerically nor dimensionally correct

Answer: C

Watch Video Solution

19. 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, c are respectively :-

A. $\left[LT^{-2}\right], [L]$ and $[T]$

B. $\left[L^2\right], [T]$ and $\left[LT^2\right]$

C. LT^2, LT and L

D. $[L], [LT]$ and $\left[T^2\right]$

Answer: A

Watch Video Solution

20. if the randon error in the arithmetic mean of 50 observations is α, then the random error in the arithmetic mean of 150 observations would be

A. α

B. 3α

C. $\frac{\alpha}{3}$

D. 2α

Answer: C

Watch Video Solution

21. Velocity v is given by $v = at^2 + bt + c$, where t is time. What are the dimensions of a, b and c respectively?

A. $\left[LT^{-3}\right], \left[LT^{-2}\right]$ and $\left[LT^{-1}\right]$

B. $\left[LT^{-1}\right], \left[LT^{-2}\right]$ and $\left[LT^{-3}\right]$

C. $\left[LT^{-2}\right], \left[LT^{-3}\right]$ and $\left[LT^{-1}\right]$

D. $\left[LT^{-1}\right], \left[LT^{-3}\right]$ and $\left[LT^{-2}\right]$

Answer: A

Watch Video Solution

22. The square root of the product of inductance and capacitance has the dimension of

A. length

B. time

C. mass

D. no dimension

Answer: B

Watch Video Solution

23. The frequency of vibration of string is given by $v = \frac{p}{2l}\left[\frac{F}{m}\right]^{1/2}$. Here p is number of segments in the

string and l is the length. The dimensional formula for m will be

A. $\left[\mathrm{M}^{0}\mathrm{LT}^{-1}\right]$

B. $\left[\mathrm{ML}^{0}\mathrm{T}^{-1}\right]$

C. $\left[\mathrm{ML}^{-1}\mathrm{T}^{0}\right]$

D. $\left[\mathrm{M}^{0}\mathrm{L}^{0}\mathrm{T}^{0}\right]$

Answer: C

Watch Video Solution

24. The numbers 2.745 and 2.735 on rounding off to 3 significant figures will give

A. 2.75 and 2.74

B. 2.74 and 2.73

C. 2.75 and 2.73

D. 2.74 and 2.74

Answer: D

Watch Video Solution

25. The mass and volume of a body are 4.237 g and $2.5cm^3$ respectively. The density of the material of the body in correct significant figures is

A. $1.6048 \ \mathrm{g} \ \mathrm{cm}^{-3}$

B. $1.69 \ \mathrm{g} \ \mathrm{cm}^{-3}$

C. $1.7 \ \mathrm{g} \ \mathrm{cm}^{-3}$

D. $1.695 \ \mathrm{g} \ \mathrm{cm}^{-3}$

Answer: C

Watch Video Solution

26. The length and breadth of a rectangular sheet are 16.2 cm and 10.1cm, respectively. The area of the sheet in appropriate significant figures and error is

A. $164 \pm 3 \ \mathrm{cm}^2$

B. $163.62 \pm 2.6 \ \mathrm{cm}^2$

C. $163.6 \pm 2.6 \quad \mathrm{cm}^2$

D. $163.62 \pm 3 \quad \mathrm{cm}^2$

Answer: A

Watch Video Solution

27. Which of the following pairs of physical quantities does not have same dimensional formula?

A. Work and torque

B. Angular momentum and Planck's constant

C. Tension and surface tension

D. Impulse and linear mementum

Answer: C

Watch Video Solution

28. Measure of two quantites along with the precision of respective measuring instrument is $A = 2.5ms^{-1} \pm 0.5ms^{-1}$

$B = 0.10s \pm 0.01s$ The value of AB will be

A. (0.25 ± 0.08) m

B.

C. (0.25 ± 0.5) m

D. (0.25 ± 0.05) m

Answer: A

Watch Video Solution

29. Which of the following measurement is most precise?

A. 5.00 mm

B. 5.00 cm

C. 5.00 m

D. 5.00 km

Answer: A

Watch Video Solution

30. The mean length of an object is $5cm$. Which of the following measurement is most accurate?

A. 4.9 cm

B. 4.805 cm

C. 5.25 cm

D. 5.4 cm

Answer: A

Watch Video Solution

31. Young s modulus of steel is $1.9 \times 10^{11} N/m^2$. When expressed in CGS units of dyne/cm^2,it will be equal to

$(1N = 10^5 \text{dyne}, 1m^2 = 10^4 cm^2)$

A. 1.9×10^{10}

B. 1.9×10^{11}

C. 1.9×10^{12}

D. 1.9×10^{13}

Answer: C

Watch Video Solution

32. If the energy (E) ,velocity (v) and force (F) be taken as fundamental quantities,then the dimension of mass will be

A. $\left[\mathrm{Fv}^{-2}\right]$

B. $\left[\mathrm{Fv}^{-1}\right]$

C. $\left[\mathrm{Ev}^{-2}\right]$

D. $\left[\mathrm{Ev}^{2}\right]$

Answer: C

Watch Video Solution

33. If "force" F, "length" L and "time T" are taken as fundamental units , the dimensional formula of mass will be

A. $\left[\mathrm{FL}^{-1}\mathrm{T}^{2}\right]$

B. $\left[\mathrm{FLT}^{-2}\right]$

C. $\left[\mathrm{FL}^{-1}\mathrm{T}^{-1}\right]$

D. $\left[\mathrm{FL}^{5}\mathrm{T}^{2}\right]$

Answer: A

Watch Video Solution

34. From the dimensional consideration, which of the following equation is correct

A. $T = 2\pi\sqrt{\frac{R^3}{GM}}$

B. $T = 2\pi\sqrt{\frac{GM}{R^3}}$

C. $T = 2\pi\sqrt{\frac{GM}{R^2}}$

D. $T = 2\pi\sqrt{\frac{R^2}{GM}}$

Answer: A

Watch Video Solution

35. If voltage $V = (100 \pm 5)$ V and current $I = (10 \pm 0.2)$ A, the percentage error in resistance R is

A. 5.2%

B. 0.25

C. 0.07

D. 0.1

Answer: C

Watch Video Solution

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

A. 1

B. 2

C. 3

D. 4

Answer: D

Watch Video Solution

37. If $x = 10.0 \pm 0.1$ and $y = 10.0 \pm 0.1$, then 2x - 2y is equal to

A. (0.0 ± 0.1)

B. Zero

C. (0.0 ± 0.4)

D. (20 ± 0.2)

Answer: C

Watch Video Solution

38. The dimensional formula for molar thermal capacity is same as that of

A. gas constant

B. specific heat

C. Boltzmann's constant

D. Stefan's constant

Answer: A

Watch Video Solution

39. Dimensions of ohm are same as that of (where h is Planck's constant and e is charge)

A. $\frac{h}{e}$

B. $\frac{h^2}{e}$

C. $\frac{h}{e^2}$

D. $\frac{h^2}{e^2}$

Answer: C

Watch Video Solution

40. The equation of state of some gases can be expressed as $\left(P + \frac{a}{V^2}\right) = \frac{R\theta}{V}$ where P is the pressure V the volume,θThe temperature and a and b are constant .The dimensional formula of a is

A. $\left[ML^5T^2\right]$

B. $\left[ML^{-1}T^{-2}\right]$

C. $\left[L^3\right]$

D. $\left[L^6\right]$

Answer: A

Watch Video Solution

41. Using mass (M), length (L), time (T) and current (A) as fundamental quantities, the dimensions of permeability are :

A. $\left[M^{-1}LT^2A\right]$

B. $\left[ML^2T^{-2}A^{-1}\right]$

C. $\left[MLT^{-2}A^{-2}\right]$

D. $\left[MLT^{-1}A^{-1}\right]$

Answer: C

Watch Video Solution

42. Let g be the acceleration due to gravity at the earth's surface and K the rotational kinetic energy of the earth. Suppose the earth's radius decreases by 2%. Keeping all other quantities constant, then

A. g increases by 2% and K increases by 2%

B. g increases by 4% and K increases by 4%

C. g increases by 4% and K increases by 2%

D. g increases by 2% and K increases by 4%

Answer: B

Watch Video Solution

43. In a system of units, the units of mass, length and time are 1 quintal, 1 km and 1h, respectively. In this system 1 N force will be equal to

A. 1 new unit

B. 129.6 new unit

C. 427.6 new unit

D. 60 new unit

Answer: B

Watch Video Solution

44. Given that $\int \frac{dx}{\sqrt{2ax - x^2}} = a^n \sin^{-1}\left(\frac{x-a}{a}\right)$ where a is a constant. Using dimensional analysis. The value of n is

A. 1

B. Zero

C. -1

D. None of these

Answer: B

Watch Video Solution

45. If momentum of an object is increased by 10%, then is kinetic energy will increase by

A. 0.2

B. 0.21

C. 0.4

D. 0.19

Answer: B

Watch Video Solution

46. The magnetic force on a point moving charge is $F = q(v \times B)$.

Here $q =$ electric charge

$v =$ velocity of the point charge

$B =$ magnetic field

The dimensions of B is

A. $\left[\mathrm{MLT}^{-1}\mathrm{A}\right]$

B. $\left[\mathrm{M}^{2}\mathrm{LT}^{-2}\mathrm{A}^{-1}\right]$

C. $\left[\mathrm{MT}^{-2}\mathrm{A}^{-1}\right]$

D. None of these

Answer: C

Watch Video Solution

47. When a capillary tube is immersed in a liquid, then liquid of mass M rises in the capillary tube.^lf capillary tube of double radius is taken then mass of same liquid rising in the tube is

A. $+10\ \%$

B. $+46\ \%$

C. $-10\ \%$

D. $-40\ \%$

Answer: B

Watch Video Solution

48. By what percentage should the pressure of a given mass of a gas be increased so as to decrease its volume by 10% at a constant temperature?

A. 0.05

B. 7.2%

C. 12.5%

D. 11.1%

Answer: D

Watch Video Solution

49. In measuring electric energy, 1 kWh is equal to

A. 3.6×10^4 J

B. 3.6×10^6 J

C. 7.3×10^6 J

D. None of these

Answer: B

Watch Video Solution

50. A quantity X is given by $\varepsilon_0 L \frac{\Delta V}{\Delta T}$ where ε_0 is the permittivity of the free space, L is a length ΔV is a potential difference nad Δt is a time interval. The dimensional formula for X is the same as that of

A. resistance

B. charge

C. voltage

D. current

Answer: D

Watch Video Solution

51. The length of a strip measured with a meter rod is $10.0cm$. Its width measured with a vernier callipers is $1.00cm$. The least count of the meter rod is $0.1cm$ and that of vernier callipers is $0.01cm$. What will be the error in its area?

A. $\pm 13\ \%$

B. $\pm 7\ \%$

C. $\pm 4\ \%$

D. $\pm 2\ \%$

Answer: D

Watch Video Solution

52. The length of a cylinder is measured with a meter rod having least count $0.1cm$. Its diameter is measured with Vernier calipers having least count $0.01cm$. Given that length is $5.0cm$ and radius is $2cm$. Find the percentage error in the calculated value of the volume.

A. 0.015

B. 0.025

C. 0.035

D. 0.04

Answer: B

Watch Video Solution

53. The length of a uniform rod is 100.0 cm and radius is 1.00 cm if length is measured with a meter rod having least count 1mm and radus is measured with vernier callipers having least count 0.1 mm the percentage error in calculated volume of cylinder is

A. 0.021

B. 0.03

C. 0.0201

D. 0.032

Answer: A

Watch Video Solution

54. You measure two quantities as A=1.0m $\pm 0.2m$, $B = 2.0m \pm 0.2m$. We should report correct value for $\sqrt{AB}$ as

A. $1.4\text{m} \pm 0.4\text{m}$

B. $1.41\text{m} \pm 0.15\text{m}$

C. $1.4\text{m} \pm 0.3\text{m}$

D. $1.4\text{m} \pm 0.2\text{m}$

Answer: D

Watch Video Solution

55. If momentum (p) area (A) and time (t) are taken to be fundamental quatities, then energy has the dimensional formula.

A. $\left[pA^{-1}T^{1}\right]$

B. $\left[p^{2}AT\right]$

C. $\left[p\,A^{-1/2}T\right]$

D. $\left[pA^{1/2}T^{-1}\right]$

Answer: D

Watch Video Solution

56. If E = energy , G= gravitational constant, I=impulse and M=mass, then dimensions of $\frac{GIM^2}{E^2}$ are same as that of

A. time

B. mass

C. length

D. force

Answer: A

Watch Video Solution

57. In the relation, $P = \frac{\alpha}{\beta} e^{\frac{\alpha Z}{k\theta}} P$ is pressure, Z is distance, k is Boltzmann constant and θ is the temperature. The dimensional formula of β will be-

A. $\left[\mathrm{M}^0\mathrm{L}^2\mathrm{T}^0\right]$

B. $\left[\mathrm{ML}^2\mathrm{T}\right]$

C. $\left[\mathrm{ML}^0\mathrm{T}^{-1}\right]$

D. $\left[\mathrm{M}^0\mathrm{L}^2\mathrm{T}^{-1}\right]$

Answer: A

Watch Video Solution

58. If E, M, L and G denote energy, mass, angular momentum and gravitational constant repectively then the quantity $\left(E^2L^2/M^5G^2\right)$ has the dimensions of :-

A. angle

B. length

C. mass

D. None of these

Answer: D

Watch Video Solution

59. A uniform wire of length L, diameter D and density ρ is stretched under a tension T. The correct relation between its fundamental frequency f, the length L and the diameter D is

A. $f \propto \frac{1}{LD}$

B. $f \propto \frac{1}{L\sqrt{D}}$

C. $f \propto \frac{1}{D^2}$

D. $f \propto \frac{1}{LD^2}$

Answer: A

Watch Video Solution

60. If the energy, $E = G^p h^q c^r$, where G is the universal gravitational constant, h is the planck's constant and c is the velocity of light, then the value of p,q and r are respectively

A. $-1/2, 1/2$ and $5/2$

B. $1/2, -1/2$ and $-5/2$

C. $-1/2, 1/2$ and $3/2$

D. $1/2, 1/2$ and $-3/2$

Answer: A

Watch Video Solution

61. A gas bubble from an explosion under water oscillates with a period T proportional to $p^a d^b E^c$ where p is the static pressure d is the density of water and E is the total energy of explosion. Find the value of a,b and c.

A. $a = 1, b = 1, c = 2$

B. $a = 1, b = 2, c = 1$

C. $a = \frac{5}{6}, b = \frac{1}{2}, c = \frac{1}{3}$

D. $a = -\frac{5}{6}, b = \frac{1}{2}, c = \frac{1}{3}$

Answer: D

Watch Video Solution

Assertion And Reason

1. Assertion : Method of dimension cannot be used for deriving formulae containing trigonometrical ratios.

Reason: This is because trigonometrical ratios have no dimensions.

A. If both Assertion and Reason are correct and Reason is the correct explaination of Assertion.

B. If both Assertion and Reason are correct but Reason is not the correct explaination of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: A

Watch Video Solution

2. Assertion : Number of significant figure in 0.005 is one and that is 0.500 is three

Reason : This is became zeros are not significant

A. (a)If both Assertion and Reason are correct and Reason is the correct explaination of Assertion.

B. (b)If both Assertion and Reason are correct but Reason is not the correct explaination of Assertion.

C. (c)If Assertion is true but Reason is false.

D. (d)If Assertion is false but Reason is true.

Answer: C

Watch Video Solution

3. Assertion: When we change the unit of measurement of a quantity, its numerical value changes.

Reason: Smaller the unit of measurement smaller is its numerical value.

A. If both Assertion and Reason are correct and Reason is the correct explaination of Assertion.

B. If both Assertion and Reason are correct but Reason is not the correct explaination of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: C

Watch Video Solution

4. Assertion : Pressure has the dimensions of energy density.

Reason : Energy density = $\frac{\text{energy}}{\text{volume}} = \frac{\left[ML^2T^{-2}\right]}{\left[L^3\right]}$

$= \left[ML^{-1}T^{-2}\right] = \text{pressure}$

A. If both Assertion and Reason are correct and Reason is the correct explaination of Assertion.

B. If both Assertion and Reason are correct but Reason is not the correct explaination of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: A

Watch Video Solution

5. Assertio: When percentage errors in the measurement of mass and velocity are 1% and 2% respectively, the percentage error in K.E. is 5%

Reason: $\frac{\Delta K}{K} = \frac{\Delta m}{m} + \frac{2\Delta v}{v}$

A. If both Assertion and Reason are correct and Reason is the correct explaination of Assertion.

B. If both Assertion and Reason are correct but Reason is not the correct explaination of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: A

Watch Video Solution

6. Assertion: The error in the measurement of radius of sphere is 0.3%. The permissible error in its surface area is 0.6%.

Reason: The permissible error is calculated by the formula $\frac{\Delta A}{A} = \frac{4\Delta r}{r}$.

A. If both Assertion and Reason are correct and Reason is the correct explaination of Assertion.

B. If both Assertion and Reason are correct but Reason is not the correct explaination of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: C

Watch Video Solution

7. Assertion : The light year and wavelength consist of dimensions of length.

Reason : Both light year and wavelength represent time.

A. If both Assertion and Reason are correct and Reason is the correct explaination of Assertion.

B. If both Assertion and Reason are correct but Reason is not the correct explaination of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: C

Watch Video Solution

8. Assersion : Out of three meansurements $l = 0.7m, l = 0.70m$ and $l = 0.700m$ the last one is most accurate.

Reason: In every meansurements only the last significant digit is not accurately known.

A. If both Assertion and Reason are correct and Reason is the correct explaination of Assertion.

B. If both Assertion and Reason are correct but Reason is not the correct explaination of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: B

Watch Video Solution

9. Assertion : A screw gauge having a smaller value of pitch has greater accuracy.

Reason : The least count of screw gauge is directly proportional to the number of divisions on circular scale.

A. (a)If both Assertion and Reason are correct and Reason is the correct explaination of Assertion.

B. (b)If both Assertion and Reason are correct but Reason is not the correct explaination of Assertion.

C. (c)If Assertion is true but Reason is false.

D. (d)If Assertion is false but Reason is true.

Answer: C

Watch Video Solution

10. Assertion : L/R and CR both have same dimensions

Reason L/R and CR both have dimensions of time

A. If both Assertion and Reason are correct and Reason is the correct explaination of Assertion.

B. If both Assertion and Reason are correct but Reason is not the correct explaination of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: A

Watch Video Solution

11. Assertion : If $x = \frac{a^n}{b^m}$ the $\frac{\Delta x}{x} = n\left(\frac{\pm \Delta a}{a}\right) - m\left(\frac{\pm \Delta b}{b}\right)$

The change in a or b i.e., Δa or Δb may be comparable to a and b.

Reason : The above relation is valid when $\Delta a << a$ and $\Delta b << b$.

A. If both Assertion and Reason are correct and Reason is the correct explaination of Assertion.

B. If both Assertion and Reason are correct but Reason is not the correct explaination of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: D

12. Assertion : Systematic errors and random errors fall in the same group of errors.

Reason : Both systematic and random errors are based on the cause of error.

A. If both Assertion and Reason are correct and Reason is the correct explaination of Assertion.

B. If both Assertion and Reason are correct but Reason is not the correct explaination of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: A

Watch Video Solution

13. Assertion : Absolute error may be negative or positive.

Reason : Absolute error is the difference between the real value and the measured value of a physical quantity.

A. If both Assertion and Reason are correct and Reason is the correct explaination of Assertion.

B. If both Assertion and Reason are correct but Reason is not the correct explaination of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: A

Watch Video Solution

14. Assertion :

$$\sqrt{\frac{\text{Magnetic dipole moment} \times \text{moment induction}}{\text{Moment of inertia}}}$$

Dimensional formula $\left[M^0L^0T\right]$

Reason : The given dimension is that of frequency.

A. If both Assertion and Reason are correct and Reason is the correct explaination of Assertion.

B. If both Assertion and Reason are correct but Reason is not the correct explaination of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: D

Watch Video Solution

15. Assertion : $\sqrt{\frac{\text{Modulus of elasticity}}{\text{Density}}}$ has the unit ms^{-1}.

Reason : Acceleration has the dimensions of $\frac{1}{\left(\sqrt{\varepsilon_0 \mu_0}\right) t}$.

A. If both Assertion and Reason are correct and Reason is the correct explaination of Assertion.

B. If both Assertion and Reason are correct but Reason is not the correct explaination of Assertion.

C. If Assertion is true but Reason is false.

D. If Assertion is false but Reason is true.

Answer: B

Watch Video Solution

Match The Column

1.

	Column I		Column II
(A)	R/L	(p)	Time
(B)	C/R	(q)	Frequency
(C)	E/B	(r)	Speed
(D)	$\sqrt{\varepsilon_0 \mu_0}$	(s)	None

Watch Video Solution

2.

	Column I		Column II
(A)	Stress	(p)	Pressure
(B)	Strain	(q)	Energy density
(C)	Modulus of elasticity	(r)	Angle
(D)	Torque	(s)	Energy

Watch Video Solution

3.

	Column I		Column II
(A)	Work	(p)	$\left[\mathrm{A}^{1/2}\mathrm{T}^{-1}\right]$
(B)	Moment of inertia	(q)	$\left[\mathrm{FA}^{1/2}\right]$
(C)	Velocity	(r)	$\left[\mathrm{FA}^{1/2}\mathrm{T}^{2}\right]$

Watch Video Solution

4.

	Column I		Column II
(A)	Electrical resistance	(p)	$\left[\mathrm{M}^{-1}\mathrm{L}^{-2}\mathrm{T}^{4}\mathrm{A}^{2}\right]$
(B)	Capacitance	(q)	$\left[\mathrm{ML}^{2}\mathrm{T}^{-2}\mathrm{A}^{-2}\right]$
(C)	Magnetic field	(r)	$\left[\mathrm{ML}^{2}\mathrm{T}^{-3}\mathrm{A}^{-2}\right]$
(D)	Inductance	(s)	$\left[\mathrm{MT}^{-2}\mathrm{A}^{-1}\right]$

Watch Video Solution

5.

	Column I		Column II
(A)	GM_eM_s	(p)	$\left[M^2L^2T^{-3}\right]$
(B)	$\frac{3RT}{M}$	(q)	$\left[ML^3T^{-2}\right]$
(C)	$\frac{F^2}{q^2}B^2$	(r)	$\left[L^2T^{-2}\right]$
(D)	$G\frac{M_e}{R_e}$	(s)	None

Watch Video Solution

6.

A.	Spring constant	1.	$\left[M^1L^2T^{-2}\right]$
B.	Pascal	2.	$\left[M^0L^0T^{-1}\right]$
C	Hertz	3.	$\left[M^1L^0T^{-2}\right]$
D.	Joule	4.	$\left[M^1L^{-1}T^{-2}\right]$

Watch Video Solution

1. Force F is given in terms of time t and distance x by $F = A\sin Ct + B\cos Dx$. Then the dimensions of A/B and C/D are

A. $\left[\mathrm{M^0L^0T^0}\right], \left[\mathrm{M^0LT^{-1}}\right]$

B. $\left[\mathrm{MLT^{-2}}\right], \left[\mathrm{M^0L^0T^{-1}}\right]$

C. $\left[\mathrm{MLT^{-2}}\right], \left[\mathrm{M^0L^{-1}T^0}\right]$

D. $\left[\mathrm{M^0LT^{-1}}\right], \left[\mathrm{M^0L^0T^0}\right]$

Answer: A

Watch Video Solution

2. The scalar quantity among the following is

A. weight of body

B. temperature gradient

C. TENSION

D. ELECTRIC POTENTINAL

Answer: D

Watch Video Solution

3. The wrong units conversion among the following is

A. 1 angstorm = 10^{-10} m

B. 1 fermi = 10^{-15} m

C. 1 light year = 9.46 $\times$ 10^{15} m

D. 1 astronomical unit = 1.496 $\times$ 10^{-11} m

Answer: D

Watch Video Solution

4. The mass of the liquid flowing per second per unit area of cross-section of the tube is proportional to (pressure difference across the ends)^(n) and (average velocity of the liquid)^(m) . Which of the following relations between m and n is correct?

A. $m = n$

B. $m = -n$

C. $m^2 = n$

D. $m = -n^2$

Answer: B

Watch Video Solution

5. The ratio of the dimensions of Planck's constant and that of the moment of inertia has the dimensions of

A. angular momentum

B. time

C. velocity

D. frequency

Answer: D

Watch Video Solution

6. In terms of basic units of mass (M), length (L), time (T), and charge (Q), the dimensions of magnetic permeability of vacuum (μ_0) would be

A. $\left[\mathrm{MLQ}^{-2}\right]$

B. $\left[\mathrm{LT}^{-1}\mathrm{Q}^{-1}\right]$

C. $\left[\mathrm{ML}^{2}\mathrm{T}^{-1}\mathrm{Q}^{-2}\right]$

D. $\left[\mathrm{LTQ}^{-1}\right]$

Answer: A

Watch Video Solution

7. The dimensional formula of electric flux is

A. $\left[ML^3I^{-1}T^{-3}\right]$

B. $\left[M^2L^2I^{-1}T^{-2}\right]$

C. $\left[ML^3I^1T^{-3}\right]$

D. $\left[ML^{-3}I^{-1}T^{-3}\right]$

Answer: A

Watch Video Solution

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

A. $\left[\mathrm{Ev}^{-2}\mathrm{T}^{-1}\right]$

B. $\left[\mathrm{Ev}^{-1}\mathrm{T}^{-2}\right]$

C. $\left[\mathrm{Ev}^{-2}\mathrm{T}^{-2}\right]$

D. $\left[\mathrm{E}^{-2}\mathrm{v}^{-1}\mathrm{T}^{-3}\right]$

Answer: C

Watch Video Solution

9. Match the following two columns.

	Column I		Column II
A.	Electrical resistance	1.	$\left[ML^3T^{-3}A^{-2}\right]$
B.	Electrical potential	2.	$\left[ML^2T^{-3}A^{-2}\right]$
C.	Specific resistance	3.	$\left[ML^2T^{-3}A^{-1}\right]$
D.	Specific conductance	4.	None

A. A-2, B-3, C-1, D-4

B. A-2, B-4, C-3, D-1

C. A-1, B-2, C-4, D-3

D. A-1, B-3, C-2, D-4

Answer: A

Watch Video Solution

10. The unit of three physical quantities x, y and z are gcm^2s^{-5}, gs^{-1} and cms^{-2} respectively. The relation between x, y and z is

A. $x = yz^2$

B. $x = y^2z$

C. $y^2 = xz$

D. $z = x^2y$

Answer: A

Watch Video Solution

11. The unit of universal gas constant is

A. watt/K

B. $\text{dyne}/^{\circ}\text{C}$

C. erg/K

D. $\text{newton}/^{\circ}\text{R}$

Answer: C

Watch Video Solution

12. Unit of emf is

A. $\text{joule}/\text{ampere}$

B. $\text{volt}/\text{ampere}$

C. $\dfrac{\text{henry-ampere}}{\text{second}}$

D. joule/coulomb

Answer: C

Watch Video Solution

13. The dimensional formula for Reynold's number is

A. $\left[L^0M^0T^0\right]$

B. $[LMT]$

C. $\left[L^{-1}MT\right]$

D. $\left[LMT^{-1}\right]$

Answer: A

Watch Video Solution

Watch Video Solution

14. The relation between force F and density d is $F = \frac{x}{\sqrt{d}}$.

The dimension of x is

A. $\left[\mathrm{L}^{-1/2}\mathrm{M}^{3/2}\mathrm{T}^{-2}\right]$

B. $\left[\mathrm{L}^{-1/2}\mathrm{M}^{1/2}\mathrm{T}^{-2}\right]$

C. $\left[\mathrm{L}^{-1}\mathrm{M}^{3/2}\mathrm{T}^{-2}\right]$

D. $\left[\mathrm{L}^{-1}\mathrm{M}^{1/2}\mathrm{T}^{-2}\right]$

Answer: A

Watch Video Solution

15. In which of the following pairs, the two physical quantities have different dimensions?

A. Planck's constant and angular momentum

B. Impulse and linear momentum

C. Moment of inertia and moment of a force

D. Energy and torque

Answer: C

Watch Video Solution

16. If the absoulte errors in two physical quantites A and B are a and b respectively, then the absoulte error in the value of $A - B$ is

A. $b - a$

B. $a \neq b$

C. $a + b$

D. $a - b$

Answer: C

Watch Video Solution

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

A. $\left[\mathrm{FvT}^{-1}\right]$

B. $\left[\mathrm{FvT}^{-2}\right]$

C. $\left[\mathrm{Fv}^{-1}\mathrm{T}^{-1}\right]$

D. $\left[\mathrm{Fv}^{-1}\mathrm{T}\right]$

Answer: D

Watch Video Solution

18. If the unit of force is 1 kN, unit of length 1 km and unit of time is 100s, what will be the unit of mass?

A. 1000 kg

B. 1 kg

C. 10000 kg

D. 100 kg

Answer: C

Watch Video Solution

19. The dimensional formula for magnetic flux is

A. $\left[ML^2T^{-2}A^{-1}\right]$

B. $\left[ML^2T^{-3}A^{-1}\right]$

C. $\left[M^{-1}L^{-2}T^2A\right]$

D. $\left[ML^3T^{-2}A^{-1}\right]$

Answer: A

Watch Video Solution

20. The dimensional formula for electric field is

A. $\left[ML^2T^{-3}A^{-1}\right]$

B. $\left[ML^2T^{-3}A^{-2}\right]$

C. $\left[MLT^{-3}A^{-1}\right]$

D. $\left[M^0L^0T^0A^0\right]$

Answer: C

Watch Video Solution

21. The quantity $[(nh)/(2\pi qB)]^{1/2}$ where n is a positive integer, h is Planck's constant q is charge and B is magnetic field has the dimensions of

A. area

B. length

C. speed

D. acceleration

Answer: A

Watch Video Solution

22. In an experiment four quantities a,b,c and d are measure with percentage error 1%, 2%, 3%,and 4% respectively quantity is P is calculate as follow

$P = \frac{a^3b^2}{cd}$ $\%$ error in P is

A. 0.14

B. 0.1

C. 0.07

D. 0.04

Answer: A

Watch Video Solution

23. Which of the following physical quantity unit is not a fundamental unit?

A. Length

B. Mass

C. Magnetic field

D. current

Answer: C

Watch Video Solution

24. The dimensional formula for rate of doing work is

A. $\left[ML^2T^{-3}\right]$

B. $\left[ML^{-3}T^2\right]$

C. $\left[M^2L^2T^2\right]$

D. $\left[MLT^{-2}\right]$

Answer: A

Watch Video Solution

25. The density of glass is $2.8\,\mathrm{gram/cc}$ in CGS system. The value of density in SI unit is

A. 2.8×10^{-3}

B. 2.8×10^{-2}

C. 2.8×10^{2}

D. 2.8×10^{6}

Answer: A

Watch Video Solution

26. The dimensional formula of electric potential is

A. $\left[ML^2T^{-3}A^{-1}\right]$

B. $\left[M^{-1}L^2T^{-2}A\right]$

C. $\left[M^{-1}L^2T^{-2}A^{-1}\right]$

D. $\left[ML^2T^{-2}A\right]$

Answer: A

Watch Video Solution

27. In the equation $\left(\frac{1}{p\beta}\right) = \frac{y}{k_BT}$, where p is the pressure, y is the distance, k_B is Boltzmann constant and

T is the tempreture. Dimensions of β are

A. $\left[\mathrm{M}^{-1}\mathrm{L}^{1}\mathrm{T}^{2}\right]$

B. $\left[\mathrm{M}^{0}\mathrm{L}^{2}\mathrm{T}^{0}\right]$

C. $\left[\mathrm{M}^{1}\mathrm{L}^{-1}\mathrm{T}^{-2}\right]$

D. $\left[\mathrm{M}^{0}\mathrm{L}^{0}\mathrm{T}^{0}\right]$

Answer: B

Watch Video Solution

28. Which one of the following is not correct ?

A. Dimension formula of thermal conductivity (K) is

$\left[\mathrm{M}^{1}\mathrm{L}^{1}\mathrm{T}^{-3}\mathrm{K}^{-1}\right]$

B. Dimension formula of potential (V) is $\left[\mathrm{M}^{1}\mathrm{L}^{2}\mathrm{T}^{3}\mathrm{A}^{-1}\right]$

C. Dimension formula of permeability of free space (μ_0) is $\left[\mathrm{M}^{1}\mathrm{L}^{1}\mathrm{T}^{-2}\mathrm{A}^{-2}\right]$

D. Dimensional formula of RC is $\left[\mathrm{M}^{0}\mathrm{L}^{0}\mathrm{T}^{-1}\right]$

Answer: B

Watch Video Solution

29. If I is moment of inertia, F is force, v is velocity, E is energy and L is length then, dimension of $\left(IF\frac{v^2}{EL^4}\right)$ will be:

A. $\left[\mathrm{MLT}^{-2}\right]$

B. $\left[\mathrm{MT}^{-2}\right]$

C. $\left[\mathrm{ML}^{2}\mathrm{T}^{-3}\right]$

D. $\left[\mathrm{LT}^{-1}\right]$

Answer: B

Watch Video Solution

30. A physical quantity $X$is give by the relation $X = \frac{2h^3I^2}{2\sqrt{n}}$ The percentage error in the meansurement of k ,I,m and n are 1% , 2% , 3% and 4% respectively

The value of X is uncertain by

A. 0.08

B. 0.1

C. 0.12

D. None of these

Answer: D

Watch Video Solution

31. The quantities A and B are related by the relation, $m = A/B$, where m is the linear density and A is the force. The dimensions of B are of

A. pressure

B. latent heat

C. work

D. None of these

Answer: B

Watch Video Solution

32. A physical quantity is represented by $X = M^a L^b T^{-c}$ .If the percentage error in the measurement of M,L and T are $\alpha\ \%$, $\beta\ \%$ and $\gamma\ \%$ to respectively, what is the total percentage error in X?

A. $a \quad \alpha + b \quad \beta + c \quad \gamma$

B. $a \quad \alpha + b \quad \beta - c \quad \gamma$

C. $\frac{a}{\alpha} + \frac{b}{\beta} + \frac{c}{\gamma}$

D. None of these

Answer: A

Watch Video Solution