2.2: The International System of Units

2015

1. Astronomical unit (Au) is the average distance between the earth and sun, approximately 1.5×10^8 km. The speed of light is about 3.0×10^8 m/s. The speed of light in astronomical unit per minute is:
   (a) 0.012 Au/min (b) 0.12 Au/min
   (c) 1.2 Au/min (d) 12.0 Au/min
   (AMU (Med.))

2. The wrong unit conversion among the following is
   (a) 1 angstrom = 10^{-10} m
   (b) 1 fermi = 10^{-15} m
   (c) 1 light year = 9.46×10^{15} m
   (d) 1 parsec = 3.08×10^{16} m
   (e) 1 astronomical unit = 1.496×10^{-11} m
   (Kerala PMT)

2013

3. Which of the following physical quantity is not a fundamental unit?
   (a) Length (b) Mass
   (c) Magnetic field (d) Current *(J & K CET)*

2012

4. The SI unit of intensity of wave is
   (a) $W\,m^2$ (b) $J\,m^{-1}\,s^{-2}$
   (c) $W\,m^{-2}$ (d) $J\,m^{-2}\,s$ *(UP CPMT)*

2011

5. The SI unit of thermal conductivity is
   (a) $J\,s\,m^{-1}\,K^{-1}$ (b) $W^{-1}\,m^{-1}\,K^{-1}$
   (c) $W\,m^{-1}\,K^{-1}$ (d) $W\,m^{-2}\,K^{-1}$
   (J & K CET)

6. The SI unit of power is
   (a) joule (b) erg
   (c) newton (d) watt
   (J & K CET)

2009

7. The SI unit of electron mobility is
   (a) $m^2\,s^{-1}\,V^{-1}$ (b) $m\,s\,V^{-1}$
   (c) $m\,s^{-1}\,V$ (d) $m^2\,s^{-2}\,V^{-2}$
   (J & K CET)

8. Which of the following quantities has not been expressed in proper unit?
   (a) Torque : newton metre
   (b) Stress : newton $metre^{-2}$
   (c) Modulus of elasticity : newton $metre^{-2}$
   (d) Power : newton metre $second^{-1}$
   (e) Surface tension : newton $metre^{-2}$
   (Kerala PMT)

2008

9. Match the following.

a.	Capacitance	i.	volt $(ampere)^{-1}$
b.	Magnetic induction	ii.	volt second $(ampere)^{-1}$
c.	Inductance	iii.	newton $(ampere)^{-1}$ $(metre)^{-1}$
d.	Resistance	iv.	$coulomb^2$ $(joule)^{-1}$

   (a) a – ii, b – iii, c – iv, d – i
   (b) a – iv, b – iii, c – ii, d – i
   (c) a – iii, b – iv, c – i, d – ii
   (d) a – iv, b – i, c – ii, d – iii
   (e) a – ii, b – iv, c – i, d – iii
   (Kerala PMT)

2.3: Measurement of Length

2014

10. The distance at which average radius of the earth orbit subtends an angle of 1 arc second is
    (a) Parsec (b) Astronomical unit
    (c) Light year (d) Unified atomic unit
    (J & K CET)

2.6: Accuracy, Precision of Instruments and Errors in Measurement

2016

11. If the error in measuring the radius of the sphere is 2% and that in measuring its mass is 3%, then the error in measuring the density of material of the sphere is
    (a) 5% (b) 7% (c) 9% (d) 11%
    (J & K CET)

2015

12. A body accelerates from rest with a uniform acceleration a for a time t. The uncertainty in 'a' is 8% and the uncertainty in 't' is 4%. The uncertainty in the speed is
    (a) 32% (b) 12%
    (c) 8% (d) 2% *(COMEDK)*

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13. Smallest division on the main scale of given vernier callipers is 0.5 mm. Vernier scale has 25 divisions and these coincide with 24 main scale divisions. The least count of vernier callipers is
(a) 0.001 cm (b) 0.002 cm
(c) 0.01 cm (d) 0.02 cm
(J & K CET)

14. If the length and time period of an oscillating pendulum have errors of 1% and 3% respectively, then the error in measurement of acceleration due to gravity is
(a) 4% (b) 5%
(c) 6% (d) 7% *(UP CPMT)*

2014

15. The measured value of length of a simple pendulum is 20 cm known with 2 mm accuracy. The time for 50 oscillations was measured to be 40 s with 1 s resolution. Calculate the percentage accuracy in the determination of acceleration due to gravity g from the above measurements.
(a) 6.0% (b) 7.2%
(c) 9.4% (d) 10.2%
(AMU (Med.))

16. The diameter of a given wire is measured by a screw gauze. The three measurements of the diameter give the reading in cm as 0.036, 0.035 and 0.037. What is the percentage error of the measurement?
(a) 1.8% (b) 2.8%
(c) 3.2% (d) 4.6% *(AMU (Med.))*

17. A physical quantity Q is found to depend on observables x, y and z, obeying relation $Q = \frac{x^3y^2}{z}$. The percentage error in the measurements of x, y and z are 1%, 2% and 4% respectively. What is percentage error in the quantity Q?
(a) 11% (b) 4%
(c) 1% (d) 3% *(Karnataka CET)*

18. Error in measurement of radius of a cylinder is 3% and in length is 1%, then find the error in measurement of volume of cylinder?
(a) 4% (b) 5%
(c) 7% (d) 1% *(UP CPMT)*

2013

19. 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
(a) 7% (b) 4%
(c) 14% (d) 10% *(NEET)*

20. The time period of oscillation of a simple pendulum is $T = 2\pi\sqrt{\frac{l}{g}}$. Measured value of l is 10 cm known to 1 mm accuracy and time for 100 oscillations of the pendulum is found to be 50 s using a wrist watch of 1 s resolution. What is the accuracy in the determination of g?
(a) 2% (b) 3%
(c) 4% (d) 5% *(UP CPMT)*

2012

21. A physical quantity X is given by $X = \frac{2k^3l^2}{m\sqrt{n}}$ 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
(a) 8% (b) 10%
(c) 12% (d) none of the above
(AMU (Med.))

22. A physical quantity z, depends upon two other physical quantities x and y, as follows. $z = ax^2y^{1/2}$ where, a is a constant. In an experiment, the quantity x is determined by measuring z and y, and using the above expression. If the percentage of error in the measurement of z and y are 10% and 12% respectively, then the percentage of error in the determined value of x is
(a) 2%
(b) 8%
(c) 15%
(d) without the value of the constant a, the percentage of error cannot be calculated *(J & K CET)*

23. When a current of (2.5 ± 0.5) A flows through a wire, it develops a potential difference of (20 ± 1) V, the resistance of the wire is
(a) $(8 \pm 2)\ \Omega$ (b) $(8 \pm 1.6)\ \Omega$
(c) $(8 \pm 1.5)\ \Omega$ (d) $(8 \pm 3)\ \Omega$ *(UP CPMT)*

24. In a slide callipers, $(m + 1)$ number of vernier divisions is equal to m number of smallest main scale divisions. If d unit is the magnitude of the smallest main scale division, then the magnitude of the vernier constant is
(a) $\frac{d}{(m+1)}$ unit (b) $\frac{d}{m}$ unit
(c) $\frac{md}{(m+1)}$ unit (d) $\frac{(m+1)d}{m}$ unit
(WB JEE)

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2010

25. 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

(a) $e_2 - e_1$ (b) $e_1 + 2e_2$
(c) $e_1 + e_2$ (d) $e_1 - 2e_2$

(AIPMT (Mains))

26. Choose the incorrect statement out of the following.

(a) Every measurement by any measuring instrument has some error.
(b) Every calculated physical quantity that is based on measured values has some error.
(c) A measurement can have more accuracy but less precision and vice versa.
(d) The percentage error is different from relative error.

(AMU (Med.))

2009

27. 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

(a) $\left(\frac{n-1}{n}\right)x$ (b) $\frac{nx}{(n-1)}$
(c) $\frac{x}{n}$ (d) $\frac{x}{(n-1)}$ *(AMU (Med.))*

2008

28. 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

(a) 8% (b) 2%
(c) 4% (d) 6% *(AIPMT)*

29. A vernier callipers (with least count = 0.1 mm) has 20 divisions of the vernier scale. The main scale divisions are of

(a) 0.2 mm (b) 0.5 mm
(c) 1.0 mm (d) 2.0 mm *(AMU (Med.))*

2007

30. The resistance R of a wire is given by the relation $R = \rho l/\pi r^2$. 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

(a) 6% (b) 9%
(c) 8% (d) 10% *(AMU (Med.))*

31. 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) 25%
(c) 7% (d) 10%
(e) 2.5% *(Kerala PMT)*

2.7: Significant Figures

2015

32. Number of significant figures in 0.0006702 is

(a) 4 (b) 8
(c) 2 (d) 7 *(JIPMER)*

33. The number of significant figures in 0.003125 is

(a) 4 (b) 5
(c) 6 (d) 7 *(UP CPMT)*

2011

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

(a) 0.007 m^2 (b) 2.64×10^{24} kg
(c) 0.0006032 m^2 (d) 6.3200 J

(AMU (Med.))

2.8: Dimensions of Physical Quantities

2015

35. The dimension of magnetic flux is

(a) $[MLT^{-1}A^{-1}]$ (b) $[ML^{-1}TA^{-2}]$
(c) $[ML^{-2}T^2A^{-2}]$ (d) $[ML^2T^{-2}A^{-1}]$

(J & K CET)

36. The dimensions of heat capacity are

(a) $[ML^{-2}T^{-2}K^{-1}]$ (b) $[ML^2T^{-2}K^{-1}]$
(c) $[M^{-1}L^2T^{-2}K^{-1}]$ (d) $[MLT^{-2}K]$ *(JIPMER)*

2014

37. Which of the following ratios has the dimension of mass?

(a) Volume/Density
(b) Surface tension/(Angular velocity)^2
(c) Linear momentum/Force
(d) Pressure/Power *(AMU (Med.))*

38. The dimensions of universal gravitational constant is

(a) $[M^2L^3T^{-2}]$ (b) $[M^{-1}L^3T^{-2}]$
(c) $[M^{-2}L^3T^{-2}]$ (d) $[M^2L^{-3}T^{-2}]$

(COMEDK)

39. Which of the following is a dimensionless quantity?

(a) Magnetic flux density
(b) Electric flux density
(c) Lumen flux density
(d) Optical density *(J & K CET)*

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40. A dimensional constant is
(a) Poisson's ratio
(b) Universal gravitational constant
(c) Relative density
(d) Refractive index *(JIPMER)*

41. The dimensions of mobility of charge carriers are
(a) $[M^{-2}T^2A]$ (b) $[M^{-1}T^2A]$
(c) $[M^{-2}T^3A]$ (d) $[M^{-1}T^3A]$
(e) $[M^{-1}T^2A^{-1}]$ *(Kerala PMT)*

42. Dimensions of torque is
(a) $[ML^2T^{-1}]$ (b) $[ML^2T^{-2}]$
(c) $[MLT^{-2}]$ (d) $[ML^{-1}T^{-2}]$ *(UP CPMT)*

43. 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 *(WB JEE)*

2013

44. The pair of quantities having same dimensions is
(a) Impulse and surface tension
(b) Angular momentum and work
(c) Work and torque
(d) Young's modulus and energy *(NEET Karnataka)*

45. The dimensions of the quantity $\vec{E} \times \vec{B}$, where $\vec{E}$ represents the electric field and $\vec{B}$ the magnetic field may be given as
(a) $[MT^{-3}]$ (b) $[M^2LT^{-5}A^{-2}]$
(c) $[M^2LT^{-3}A^{-1}]$ (d) $[MLT^{-2}A^{-2}]$ *(AMU (Med.))*

2012

46. The dimensions of $(\mu_0\varepsilon_0)^{-1/2}$ are
(a) $[L^{1/2}T^{-1/2}]$ (b) $[L^{-1}T]$
(c) $[LT^{-1}]$ (d) $[L^{1/2}T^{1/2}]$ *(AIPMT (Mains), AIPMT 2011)*

47. What are the dimensions of electrical conductivity? (I is current)
(a) $[ML^{-3}T^3I^2]$ (b) $[M^{-1}L^3T^3I^2]$
(c) $[M^{-1}L^{-3}T^3I^2]$ (d) $[M^{-1}L^{-3}T^3I]$ *(J & K CET)*

48. The flux density of mass is defined as the amount of mass crossing unit area per unit time. The dimension of this quantity is
(a) $[ML^{-2}T^{-1}]$ (b) $[ML^2T^{-1}]$
(c) $[MLT^{-1}]$ (d) $[M^{-1}L^{-2}T]$ *(J & K CET)*

49. The dimensions of gravitational constant G are
(a) $[M^{-1}L^2T^{-2}]$ (b) $[M^0L^0T^0]$
(c) $[MT^{-2}]$ (d) $[ML^2T^{-2}]$
(e) $[M^{-1}L^3T^{-2}]$ *(Kerala PMT, AFMC 2011)*

50. The dimensions of magnetic flux are
(a) $[ML^2T^{-2}A^{-1}]$ (b) $[ML^2T^{-2}A^{-2}]$
(c) $[MLT^{-3}A^{-1}]$ (d) $[ML^0T^{-2}A^{-1}]$ *(OJEE)*

2011

51. The dimensions of energy density are
(a) $[ML^{-1}T^{-2}]$ (b) $[MLT^{-2}]$
(c) $[ML^{-2}T^{-1}]$ (d) $[M^2L^{-1}T^{-2}]$ *(BHU)*

52. The dimension of impulse is
(a) $[MLT^{-1}]$ (b) $[ML^2T^{-1}]$
(c) $[ML^{-1}T^{-1}]$ (d) $[MT^{-1}]$ *(J & K CET, AFMC 2010)*

53. Surface tension has the same dimensions as that of
(a) coefficient of viscosity
(b) impulse (c) momentum
(d) spring constant (e) frequency *(Kerala PMT)*

54. $[ML^2T^{-3}]$ is the dimensions of
(a) work (b) power
(c) force (d) momentum *(OJEE)*

55. $\frac{E^2}{\mu_0}$ has the dimensions of (where E is electric field and μ_0 is permeability of free space)
(a) $[ML^3T^{-2}]$ (b) $[M^{-1}L^2TA^{-2}]$
(c) $[MLT^{-4}]$ (d) $[M^2L^3T^{-2}A^2]$ *(UP CPMT)*

56. The dimensions of $\frac{\text{electric flux}}{\text{magnetic flux}}$ are same as that of
(a) acceleration (b) velocity
(c) area (d) current *(UP CPMT)*

57. The dimensions of coefficient of viscosity are
(a) $[ML^{-1}T^{-1}]$ (b) $[MLT^{-2}]$
(c) $[MLT^{-1}]$ (d) $[ML^2T^{-2}]$ *(J & K CET)*

2010

58. The dimension of $\frac{1}{2}\varepsilon_0E^2$, where ε_0 is permittivity of free space and E is electric field, is
(a) $[ML^2T^{-2}]$ (b) $[ML^{-1}T^{-2}]$
(c) $[ML^2T^{-1}]$ (d) $[MLT^{-1}]$ *(AIPMT)*

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59. Which of the following pairs does not have similar dimensions?
(a) Stress and pressure
(b) Tension and surface tension
(c) Angle and strain
(d) Planck's constant and angular momentum
(AFMC, AIIMS 2007)

60. From the following pairs of physical quantities, choose the pair that does not have same dimensions.
(a) Angular momentum and Planck's constant
(b) Moment of inertia and moment of force
(c) Work and torque
(d) Impulse and momentum
(e) Work and energy
(Kerala PMT)

61. The dimensions of 'resistance' are same as those of..... where h is the Planck's constant, e is the charge.
(a) $\frac{h^2}{e^2}$ (b) $\frac{h^2}{e}$
(c) $\frac{h}{e^2}$ (d) $\frac{h}{e}$ *(Karnataka CET)*

2009

62. If the dimensions of a physical quantity are given by $[M^aL^bT^c]$, then the physical quantity will be
(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 $a = 1, b = -1, c = -2$
(AIPMT)

63. The dimensions of specific resistance are
(a) $[ML^2T^{-2}A^{-1}]$ (b) $[ML^3T^{-3}A^{-2}]$
(c) $[ML^3T^{-2}A^{-1}]$ (d) $[ML^2T^{-2}A^{-2}]$
(AIIMS)

64. What are the dimensions of permeability?
(a) $[MLTA^{-2}]$ (b) $[MLT^{-2}A^{-2}]$
(c) $[M^2L^2TA^0]$ (d) $[ML^2T^2A^{-2}]$
(AFMC)

65. Dimensions of self inductance are
(a) $[MLT^{-2}A^{-3}]$ (b) $[ML^{-2}T^{-1}A^{-2}]$
(c) $[ML^2T^{-2}A^{-2}]$ (d) $[ML^2T^{-2}A^{-1}]$
(BHU)

66. Which of the following pairs of physical quantities have same dimensions?
(a) Force and power (b) Torque and energy
(c) Torque and power (d) Force and torque
(OJEE)

2008

67. Which two of the following five physical parameters have the same dimensions ?
1. Energy density 2. Refractive index
3. Dielectric constant 4. Young's modulus
5. Magnetic field
(a) 1 and 4 (b) 1 and 5
(c) 2 and 4 (d) 3 and 5
(AIPMT)

68. In an electrical circuit containing L, C and R which of the following does not denote the dimensions of frequency?
(a) LC (b) $\frac{1}{\sqrt{LC}}$
(c) $\frac{1}{RC}$ (d) $\frac{R}{L}$
(AIIMS)

69. If g = acceleration due to gravity and R = radius of the earth, then $\left(\frac{g}{R}\right)^{1/2}$ represents the dimension of
(a) angular speed (b) escape speed
(c) orbital speed (d) acceleration
(BHU)

70. The dimension of modulus of rigidity is
(a) $[ML^{-1}T^{-2}]$ (b) $[M^{-1}LT^{-2}]$
(c) $[M^2LT^{-2}]$ (d) $[ML^{-2}T^{-2}]$
(BHU)

71. The dimension of Planck's constant is same as that of
(a) angular momentum (b) linear momentum
(c) work (d) coefficient of viscosity
(OJEE)

2007

72. 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
(a) $[ML^2T^{-2}]$ (b) $[ML^2T^{-1}I^{-1}]$
(c) $[ML^2T^{-3}I^{-2}]$ (d) $[ML^2T^{-3}I^{-1}]$
(AIPMT)

73. What are the dimensions of impedance ?
(a) $[ML^2T^{-3}I^{-2}]$ (b) $[M^{-1}L^{-2}T^3I^2]$
(c) $[ML^3T^{-3}I^{-2}]$ (d) $[M^{-1}L^{-3}T^3I^2]$
(AIIMS)

74. The only mechanical quantity which has negative dimension of mass is
(a) angular momentum
(b) torque
(c) coefficient of thermal conductivity
(d) gravitational constant *(J & K CET)*

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2.9: Dimensional Formulae and Dimensional Equations

2015

75. The Dimensional formula of Planck's constant h is
(a) $[ML^2T^{-1}]$ (b) $[ML^2T^{-3}]$
(c) $[MLT^{-1}]$ (d) $[ML^3T^{-3}]$
(AMU (Med.), J & K CET, AIIMS 2009)

2014

76. Which two of the following quantities are dimensionally equivalent?
(i) Force (ii) Pressure
(iii) Young's Modulus (iv) Energy
(a) (i) and (ii) (b) (i) and (iii)
(c) (ii) and (iii) (d) (ii) and (iv)
(COMEDK)

77. The dimensional formula for electric flux is
(a) $[ML^2T^2]$ (b) $[ML^3T^{-3}A^{-1}]$
(c) $[ML^{-3}T^3A^1]$ (d) $[ML^{-1}T^3A^{-2}]$
(JIPMER)

2013

78. Dimensional formula of angular momentum is
(a) $[ML^2T^{-1}]$ (b) $[M^2L^2T^{-2}]$
(c) $[ML^2T^{-3}]$ (d) $[MLT^{-1}]$
(AIIMS, WB JEE 2012)

79. The dimensional formula of electric potential is
(a) $[ML^2T^{-3}A^{-1}]$ (b) $[M^{-1}L^2T^{-2}A]$
(c) $[M^{-1}L^2T^{-2}A^{-1}]$ (d) $[ML^2T^{-2}A]$
(J & K CET)

80. Which one of the following is NOT correct?
(a) Dimensional formula of thermal conductivity (K) is $[M^1L^1T^{-3}K^{-1}]$.
(b) Dimensional formula of potential (V) is $[M^1L^2T^3A^{-1}]$.
(c) Dimensional formula of permeability of free space(μ_0) is $[M^1L^1T^{-2}A^{-2}]$.
(d) Dimensional formula of RC is $[M^0L^0T^1]$.
(Karnataka CET)

2012

81. Dimensional formula of ΔQ, heat supplied to the system is
(a) $[ML^2T^{-2}]$ (b) $[MLT^{-2}]$
(c) $[ML^2T^{-1}]$ (d) $[MLT^1]$
(AIIMS)

82. The dimensional formula of physical quantity is $[M^a L^b T^c]$. Then that physical quantity is
(a) surface tension if $a = 1, b = 1, c = -2$
(b) force if $a = 1, b = 1, c = 2$
(c) angular frequency if $a = 0, b = 0, c = -1$
(d) spring constant if $a = 1, b = -1, c = -2$
(Karnataka CET)

83. $[ML^3T^{-3}A^{-2}]$ is the dimensional formula of
(a) resistance (b) resistivity
(c) conductance (d) conductivity
(UP CPMT)

2011

84. If C be the capacitance and V be the electric potential, then the dimensional formula of CV^2 is
(a) $[M^1L^2T^{-2}A^0]$ (b) $[M^1L^1T^{-2}A^{-1}]$
(c) $[M^0L^1T^{-2}A^0]$ (d) $[M^1L^{-3}T^1A^{-1}]$
(Karnataka CET)

2009

85. **Assertion :** The dimensional formula for product of resistance and conductance is same as for dielectric constant.
Reason : Both have dimensions of time constant.
(a) If both assertion and reason are true and reason is the correct explanation of assertion.
(b) If both assertion and reason are true but reason is not the correct explanation of assertion.
(c) If assertion is true but reason is false.
(d) If both assertion and reason are false. *(AIIMS)*

2008

86. Dimensional formula of stress is
(a) $[ML^{-1}T^2]$ (b) $[ML^{-1}T^{-2}]$
(c) $[ML^{-1}T^{-1}]$ (d) $[MLT^{-2}]$ *(AFMC)*

87. Dimensional formula for force is
(a) $[ML^2T^{-2}]$ (b) $[MLT^{-2}]$
(c) $[ML^{-1}T^{-2}]$ (d) $[ML^{-2}T^{-2}]$
(J & K CET)

2007

88. The dimensional formula for impulse is
(a) $[MLT^{-1}]$ (b) $[ML^{-1}T]$
(c) $[M^{-1}LT^{-1}]$ (d) $[ML^{-1}T^{-1}]$
(Karnataka CET)

89. Dimensional formula for coefficient of thermal conductivity is
(a) $[ML^{-1}T^{-3}K]$ (b) $[MLT^{-3}K^{-1}]$
(c) $[ML^2T^2K^{-1}]$ (d) $[M^2LT^{-3}K^{-1}]$
(UP CPMT)

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2.10: Dimensional Analysis and its Applications

2016

90. If $x = at + bt^2$ where x is the metre (m) and t is in hour (hr) then unit of b will be

(a) m^2/hr (b) m

(c) m/hr (d) m/hr^2

(WB JEE)

2015

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

(a) $-1, -1, -1$ (b) $1, 1, 1$

(c) $1, -1, -1$ (d) $-1, -1, 1$ *(AIPMT)*

92. Suppose refractive index μ is given as

$$\mu = A + \frac{B}{\lambda^2}$$

where A and B are constants and λ is wavelength, then dimensions of B are same as that of

(a) wavelength (b) volume

(c) pressure (d) area *(JIPMER)*

93. Dimensions of ohm are same as (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) $\frac{h^2}{e^2}$ *(UP CPMT)*

2014

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

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

(c) $[FV^{-1}T^{-1}]$ (d) $[FV^{-1}T]$

(AIPMT)

95. If the units of length, mass and force are chosen as fundamental units, the dimensions of time would be

(a) $[M^{1/2}L^{-1/2}F^{1/2}]$ (b) $[M^{1/2}L^{1/2}F^{1/2}]$

(c) $[M^{1/2}L^{1/2}F^{-1/2}]$ (d) $[M^{1/2}L^{-1/2}F^{-1/2}]$

(AIIMS)

96. The van der Waal equation is given as

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

where a and b are van der wall constants, then dimensions of 'a' will be

(a) $[ML^5T]$ (b) $[ML^{-5}T^{-1}]$

(c) $[ML^5T^{-2}]$ (d) $[M^{-1}L^5T^{-2}]$

(UP CPMT)

97. If n denotes a positive integer, h the Planck's constant, q the charge and B the magnetic field, then the quantity $\left(\frac{nh}{2\pi qB}\right)$ has the dimensions of

(a) area (b) length

(c) speed (d) acceleration

(WB JEE)

2013

98. The equation of state of a gas is given by $\left(P + \frac{a}{V^3}\right)(V - b^2) = cT$, where P, V, T are pressure, volume and temperature respectively, and a, b, c are constants. The dimensions of a and b are respectively

(a) $[ML^8T^{-2}]$ and $[L^{3/2}]$ (b) $[ML^5T^{-2}]$ and $[L^3]$

(c) $[ML^5T^{-2}]$ and $[L^6]$ (d) $[ML^6T^{-2}]$ and $[L^{3/2}]$

(WB JEE)

2012

99. If velocity (v), acceleration (a) and force (F) are taken as fundamental quantities, the dimensions of Young's modulus (Y) would be

(a) $[Fa^2v^{-2}]$ (b) $[Fa^2v^{-3}]$

(c) $[Fa^2v^{-4}]$ (d) $[Fa^2v^{-5}]$

(BHU)

2011

100. 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

(a) 0.04 (b) 0.4

(c) 40 (d) 400 *(AIPMT (Mains))*

2010

101. 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 values 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 $-3/2$

(AIIMS)

102. $x = at + bt^2$, where x = distance, t = time, a and b are constants, then the unit b is

(a) km s (b) km s^{-1}

(c) km s^{-2} (d) km s^2 *(AFMC)*

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2009

103. The van der Waals equation of state for real gases is given as $\left(P+\frac{a}{V^2}\right)(V-b)=nRT$. Which of the following terms has dimensions different from that of energy?

(a) PV (b) $\frac{a}{V^2}$

(c) $\frac{ab}{V^2}$ (d) bP *(AMU (Med.))*

2008

104. If units of force and length become 3 times then what will be the value of energy $E = 81$ J, in new units?

(a) 81 J (b) 9 J

(c) 729 J (d) 700 J *(AFMC)*

105. The velocity of a particle (v) at an instant t is given by $v = at + bt^2$. The dimension of b is

(a) [L] (b) $[LT^{-1}]$

(c) $[LT^{-2}]$ (d) $[LT^{-3}]$ *(WB JEE)*

2007

106. If energy (E), velocity (v) and force (F) be taken as fundamental quantities, then what are the dimensions of mass ?

(a) $[Ev^2]$ (b) $[Ev^{-2}]$

(c) $[Fv^{-1}]$ (d) $[Fv^{-2}]$ *(BHU)*

107. If force is proportional to square of velocity, then the dimension of proportionality constant is

(a) $[MLT^0]$ (b) $[MLT^{-1}]$

(c) $[ML^{-2}T]$ (d) $[ML^{-1}T^0]$ *(OJEE)*

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