# EXERCISE-I

## Units

**1.** Temperature can be expressed as a derived quantity in terms of any of the following
(A) Length and mass
(B) Mass and time
(C) Length, mass and time
(D) None of these

**2.** Unit of power is
(A) *Kilowatt* (B) *Kilowatt-hour*
(C) *Dyne* (D) *Joule*

**3.** Density of wood is $0.5 gm/cc$ in the CGS system of units. The corresponding value in MKS units is
(A) 500 (B) 5
(C) 0.5 (D) 5000

**4.** Unit of energy is
(A) $J/\sec$ (B) $Watt-day$
(C) *Kilowatt* (D) $gm\text{-}cm/\sec^2$

**5.** Which is the correct unit for measuring nuclear radii
(A) *Micron* (B) *Millimetre*
(C) *Angstrom* (D) *Fermi*

**6.** One Mach number is equal to
(A) Velocity of light
(B) Velocity of sound (332 $m/\sec$)
(C) 1 $km/\sec$
(D) $1 m/\sec$

**7.** The unit for nuclear dose given to a patient is
(A) *Fermi* (B) Rutherford
(C) Curie (D) Roentgen

**8.** *Volt*/*metre* is the unit of
(A) Potential (B) Work
(C) Force (D) Electric intensity

**9.** Newton/metre$^2$ is the unit of
(A) Energy (B) Momentum
(C) Force (D) Pressure

**10.** The unit of surface tension in SI system is
**(A)** $Dyne/cm^2$ **(B)** $Newton/m$
(C) $Dyne/cm$ (D) $Newton/m^2$

**11.** The unit of reduction factor of tangent galvanometer is
(A) *Ampere* (B) *Gauss*
(C) *Radian* (D) None of these

**12.** The unit of self-inductance of a coil is
(A) *Farad* (B) *Henry*
(C) *Weber* (D) *Tesla*

**13.** *Henry*/*ohm* can be expressed in
(A) *Second* (B) *Coulomb*
(C) *Mho* (D) *Metre*

**14.** The SI unit of momentum is
(A) $\frac{kg}{m}$ (B) $\frac{kg.m}{\sec}$
(C) $\frac{kg.m^2}{\sec}$ (D) $kg \times Newton$

**15.** The velocity of a particle depends upon as $v = a + bt + ct^2$; if the velocity is in $m/\sec$, the unit of $a$ will be
(A) $m/\sec$ (B) $m/\sec^2$
(C) $m^2/\sec$ (B) $m/\sec^3$

**16.** One million electron *volt* $(1 MeV)$ is equal to
(A) $10^5 eV$ (B) $10^6 eV$
(C) $10^4 eV$ (D) $10^7 eV$

**17.** $Erg - m^{-1}$ can be the unit of measure for
(A) Force (B) Momentum
(C) Power (D) Acceleration

**18.** The unit of potential energy is
(A) $g(cm/\sec^2)$ (B) $g(cm/\sec)^2$
(C) $g(cm^2/\sec)$ (D) $g(cm/\sec)$

**19.** Which of the following represents a *volt*
(A) *Joule*/*second* (B) *Watt*/*Ampere*
(C) *Watt*/*Coulomb* (D) *Coulomb*/*Joule*

**20.** $Kilowatt - hour$ is a unit of
(A) Electrical charge (B) Energy
(C) Power (D) Force

**21.** Unit of stress is
(A) $N/m$ (B) $N - m$
(C) $N/m^2$ (D) $N - m^2$

**22.** Unit of Stefan's constant is

(A) $J\,s^{-1}$ (B) $J\,m^{-2}s^{-1}K^{-4}$

(C) $J\,m^{-2}$ (D) $J\,s$

**23.** Unit of magnetic moment is

(A) *Ampere–metre*$^2$ (B) *Ampere–metre*

(C) *Weber–metre*$^2$ (C) *Weber*/*metre*

**24.** Curie is a unit of

(A) Energy of γ-rays (B) Half life

(C) Radioactivity (D) Intensity of γ-rays

**25.** Hertz is the unit for

(A) Frequency (B) Force

(C) Electric charge (D) Magnetic flux

**26.** One pico *Farad* is equal to

(A) $10^{-24}\,F$ (B) $10^{-18}\,F$

(C) $10^{-12}\,F$ (D) $10^{-6}\,F$

**27.** In SI, *Henry* is the unit of

(A) Self inductance (B) Mutual inductance

(C) (A) and (B) both (D) None of the above

**28.** The unit of $e.m.f.$ is

(A) *Joule* (B) *Joule-Coulomb*

(C) *Volt–Coulomb* (D) *Joule*/*Coulomb*

**29.** Which of the following is not the unit of time

(A) Micro *second* (B) Leap year

(C) Lunar months (D)Parallactic *second*

**30.** Unit of self inductance is

(A) $\frac{Newton\ -\ second}{Coulomb\ \times Ampere}$ (B) $\frac{Joule/Coulomb\times Second}{Ampere}$

(C) $\frac{Volt\times metre}{Coulomb}$ (D) $\frac{Newton\ \times metre}{Ampere}$

## Measurements

**31.** Out of the following, the only pair that does not have identical dimensions is

(A) Angular momentum and Planck's constant

(B) Moment of inertia and moment of a force

(C) Work and torque

(D) Impulse and momentum

**32.** The dimensional formula for impulse is same as the dimensional formula for

(A) Momentum

(B) Force

(C) Rate of change of momentum

(D) Torque

**33.** Which of the following is dimensionally correct

(A) Pressure = Energy per unit area

(B) Pressure = Energy per unit volume

(C) Pressure = Force per unit volume

(D) Pressure = Momentum per unit volume per unit time

**34.** Planck's constant has the dimensions (unit) of

(A) Energy (B) Linear momentum

(C) Work (D) Angular momentum

**35.** The equation of state of some gases can be expressed as $\left(P+\frac{a}{V^2}\right)(V-b)=RT$. Here $P$ is the pressure, $V$ is the volume, $T$ is the absolute temperature and $a, b, R$ are constants. The dimensions of '$a$' are

(A) $ML^5T^{-2}$ (B) $ML^{-1}T^{-2}$

(C) $M^0L^3T^0$ (D) $M^0L^6T^0$

**36.** If $V$ denotes the potential difference across the plates of a capacitor of capacitance $C$, the dimensions of $CV^2$ are

(A) Not expressible in $MLT$

(B) $MLT^{-2}$

(C) $M^2LT^{-1}$

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

**37.** If $L$ denotes the inductance of an inductor through which a current $i$ is flowing, the dimensions of $Li^2$ are

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

(B) Not expressible in $MLT$

(C) $MLT^{-2}$

(D) $M^2L^2T^{-2}$

**38.** Of the following quantities, which one has dimensions different from the remaining three
(A) Energy per unit volume
(B) Force per unit area
(C) Product of voltage and charge per unit volume
(D) Angular momentum per unit mass

**39.** A spherical body of mass $m$ and radius $r$ is allowed to fall in a medium of viscosity $\eta$. The time in which the velocity of the body increases from zero to 0.63 times the terminal velocity $(v)$ is called time constant $(\tau)$. Dimensionally $\tau$ can be represented by
(A) $\frac{mr^2}{6\pi\eta}$ (B) $\sqrt{\left(\frac{6\pi mr\eta}{g^2}\right)}$
(C) $\frac{m}{6\pi\eta rv}$ (D) None of the above

**40.** The frequency of vibration $f$ of a mass $m$ suspended from a spring of spring constant $K$ is given by a relation of this type $f = C m^x K^y$; where $C$ is a dimensionless quantity. The value of $x$ and $y$ are
(A) $x = \frac{1}{2}, y = \frac{1}{2}$ (B) $x = -\frac{1}{2}, y = -\frac{1}{2}$
(C) $x = \frac{1}{2}, y = -\frac{1}{2}$ (D) $x = -\frac{1}{2}, y = \frac{1}{2}$

**41.** 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) Work
(C) Latent heat (D) None of the above

**42.** The velocity of water waves $v$ may depend upon their wavelength $\lambda$, the density of water $\rho$ and the acceleration due to gravity $g$. The method of dimensions gives the relation between these quantities as
(A) $v^2 rg$ (B) $v^2 \propto g\lambda\rho$
(C) $v^2 \propto g\lambda$ (D) $v^2 \propto g^{-1}\lambda^{-3}$

**43.** The dimensions of *Farad* are
(A) $M^{-1}L^{-2}T^2Q^2$ (B) $M^{-1}L^{-2}TQ$
(C) $M^{-1}L^{-2}T^{-2}Q$ (D) $M^{-1}L^{-2}TQ^2$

**44.** The dimensions of resistivity in terms of $M, L, T$ and $Q$ where $Q$ stands for the dimensions of charge, is
(A) $ML^3T^{-1}Q^{-2}$ (B) $ML^3T^{-2}Q^{-1}$
(C) $ML^2T^{-1}Q^{-1}$ (D) $MLT^{-1}Q^{-1}$

**45.** The equation of a wave is given by
$$Y = A\sin\omega\left(\frac{x}{v} - k\right)$$
where $\omega$ is the angular velocity and $v$ is the linear velocity. The dimension of $k$ is
(A) $LT$ (B) $T$
(C) $T^{-1}$ (D) $T^2$

**46.** The dimensions of coefficient of thermal conductivity is
(A) $ML^2T^{-2}K^{-1}$ (B) $MLT^{-3}K^{-1}$
(C) $MLT^{-2}K^{-1}$ (D) $MLT^{-3}K$

**47.** Dimensional formula of stress is
(A) $M^0LT^{-2}$ (B) $M^0L^{-1}T^{-2}$
(C) $ML^{-1}T^{-2}$ (D) $ML^2T^{-2}$

**48.** Dimensional formula of velocity of sound is
(A) $M^0LT^{-2}$ (B) $LT^0$
(C) $M^0LT^{-1}$ (D) $M^0L^{-1}T^{-1}$

**49.** Dimensional formula of capacitance is
(A) $c^2g^0p^{-2}$ (B) $ML^2T^4A^{-2}$
(C) $MLT^{-4}A^2$ (D) $M^{-1}L^{-2}T^{-4}A^{-2}$

**50.** $MLT^{-1}$ represents the dimensional formula of
(A) Power (B) Momentum
(C) Force (D) Couple

**51.** $ML^{-1}T^{-2}$ represents
(A) Stress
(B) Young's Modulus
(C) Pressure
(D) All the above three quantities

**52.** Dimensions of magnetic field intensity is
(A) $[M^0L^{-1}T^0A^1]$ (B) $[MLT^{-1}A^{-1}]$
(C) $[ML^0T^{-2}A^{-1}]$ (D) $[MLT^{-2}A]$

**53.** The force $F$ on a sphere of radius '$a$' moving in a medium with velocity '$v$' is given by $F = 6\pi\eta a v$. The dimensions of $\eta$ are

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

(C) $MLT^{-2}$ (D) $ML^{-3}$

**54.** Which physical quantities have the same dimension

(A) Couple of force and work

(B) Force and power

(C) Latent heat and specific heat

(D) Work and power

**55.** Two quantities A and B have different dimensions. Which mathematical operation given below is physically meaningful

(A) $A/B$ (B) $A+B$

(C) $A-B$ (D) None

**56.** Given that $v$ is speed, $r$ is the radius and $g$ is the acceleration due to gravity. Which of the following is dimensionless

(A) $v^2/rg$ (B) $v^2r/g$

(C) $v^2g/r$ (D) $v^2rg$

**57.** The physical quantity which has the dimensional formula $M^1T^{-3}$ is

(A) Surface tension (B) Solar constant

(C) Density (D) Compressibility

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

(A) $MLT^{-3}$ and $ML^2T^{-4}$ (B) $MLT^{-3}$ and $MLT^{-4}$

(C) $MLT^{-1}$ and $MLT^0$ (D) $MLT^{-4}$ and $MLT^1$

**59.** The dimensions of inter atomic force constant are

(A) $MT^{-2}$ (B) $MLT^{-1}$

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

**60.** If the speed of light $(c)$, acceleration due to gravity $(g)$ and pressure $(p)$ are taken as the fundamental quantities, then the dimension of gravitational constant is

(A) $c^2g^0p^{-2}$ (B) $c^0g^2p^{-1}$

(C) $cg^3p^{-2}$ (D) $c^{-1}g^0p^{-1}$

**61.** If the time period $(T)$ of vibration of a liquid drop depends on surface tension $(S)$, radius $(r)$ of the drop and density $(\rho)$ of the liquid, then the expression of $T$ is

(A) $T = k\sqrt{\rho r^3/S}$ (B) $T = k\sqrt{\rho^{1/2}r^3/S}$

(C) $T = k\sqrt{\rho r^3/S^{1/2}}$ (D) None of these

**62.** $ML^3T^{-1}Q^{-2}$ is dimension of

(A) Resistivity (B) Conductivity

(C) Resistance (D) None of these

**63.** Dimension of electric current is

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

(C) $[M^2LT^{-1}Q]$ (D) $[M^2L^2T^{-1}Q]$

**64.** The fundamental physical quantities that have same dimensions in the dimensional formulae of torque and angular momentum are

(A) Mass, time (B) Time, length

(C) Mass, length (D) Time, mole

**65.** If pressure $P$, velocity $V$ and time $T$ are taken as fundamental physical quantities, the dimensional formula of force is

(A) $PV^2T^2$ (B) $P^{-1}V^2T^{-2}$

(C) $PVT^2$ (D) $P^{-1}VT^2$