UNITS AND MEASUREMENTS 1

(1.)The Vander Waal's 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

(2.)A calorie is a unit of heat and equal 4.2 J. Suppose we employ a system of units in which the unit of mass is αkg, the unit of length is β metre and the unit of time is γ sec. In this new system. 1 calorie =

(a.) $\alpha^{-1}\beta^{-2}\gamma^2$

(b.) $4.2\alpha\beta^2\gamma^2$

(c.) $\alpha\beta^2\gamma^2$

(d.) $4.2\alpha^{-1}\beta^{-2}\gamma^2$

(3.)Which is the correct unit for measuring nuclear radii

(a.) *Micron*

(b.) *Millimetre*

(c.) *Angstrom*

(d.) *Fermi*

(4.)The dimensional formula for Boltzmann's constant is

(a.) $[ML^2T^{-2}\theta^{-1}]$

(b.) $[ML^2T^{-2}]$

(c.) $[ML^0T^{-2}\theta^{-1}]$

(d.) $[ML^{-2}T^{-1}\theta^{-1}]$

(5.)$Newton\,/metre^2$ is the unit of

(a.) Energy

(b.) Momentum

(c.) Force

(d.) Pressure

(6.)Given, Force $=\frac{\alpha}{\text{density}+\beta^3}$

What are the dimensions of α,β?

(a.) $[ML^2T^{-2}],[ML^{-1/3}]$

(b.) $[M^2L^4T^{-2}]$, $[M^{1/3}L^{-1}]$

(c.) $[M^2L^{-2}T^{-2}]$, $[M^{1/3}L^{-1}]$

(d.) $[M^2L^{-2}T_2]$, $[ML^{-3}]$

(7.)If the velocity v(is cms^{-1}) of a particle is given in terms of t (in second) by the relation $v = at + \frac{b}{t+c}$

then, the dimensions of a, b and c are

abc

(a.) $[L][LT][T^2]$

(b.) $[L^2][T][LT^{-2}]$

(c.) $[LT^2][LT][L]$

(d.) $[LT^{-2}][L][T]$

(8.)The length l, breadth b and thickness t of a block are measured with the help of a metre scale. Given

$l = 15.12 \pm 0.01$cm, $b = 10.15 \pm 0.01$cm, $t = 5.28 \pm 0.01$cm.

The percentage error in volume is

(a.) 0.64%

(b.) 0.28%

(c.) 0.37%

(d.) 0.48%

(9.)If C, R, L and I denote capacity, resistance, inductance and electric current respectively, the quantities having the same dimensions of time are

(1) CR

(2) $\frac{L}{R}$

(3) $\sqrt{LC}$

(4) LI^2

(a.) (1) and (2) only

(b.) (1) and (3) only

(c.) (1) and (4) only

(d.) (1), (2) and (3) only

(10.)Which is different from others by units

(a.) Phase difference

(b.) Mechanical equivalent

(c.) Loudness of sound

(d.) Poisson's ratio

(11.)Which of the following quantities has the same dimensions as that of energy (a.) Power

(b.) Force

(c.) Momentum

(d.) Work

(12.)In the equation $y = a \sin(\omega t + kx,)$ the dimensional formula of ω is

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

(b.) $[M^0LT^{-1}]$

(c.) $[ML^0T^0]$

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

(13.)The dimensions of time constant are

(a.) $[M^0L^0T^0]$

(b.) $[M^0L^0T]$

(c.) $[MLT]$

(d.) None of these

(14.)Which unit is not for length

(a.) Parsec

(b.) Light year

(c.) Angstrom

(d.) Nano

(15.)$1 kWh$ =

(a.) $1000\ W$

(b.) $36 \times 10^5\ J$

(c.) $1000\ J$

(d.) $3600\ J$

(16.)Unit of impulse is

(a.) $Newton$

(b.) $kg - m$

(c.) $kg - m/s$

(d.) $Joule$

(17.)The physical quantity having the dimensions $[M^{-1}L^{-3}T^3A^2]$ is

(a.) Resistance

(b.) Resistivity

(c.) Electrical conductivity

(d.) Electromotive force

(18.)The number of significant figures in the numbers 4.8000×10^4 and 48000.50 are respectively

(a.) 5 and 6

(b.) 5 and 7

(c.) 2 and 7

(d.) 2 and 6

(19.)If the time period (T) of vibration of a liquid drop depends on surface tension (S), radius (r) of the drop and density (ρ) 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

(20.)Dimensions of potential energy are

(a.) MLT^{-1}

(b.) ML^2T^{-2}

(c.) $ML^{-1}T^{-2}$

(d.) $ML^{-1}T^{-2}$

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

(a.) 5.2%

(b.) 25%

(c.) 7%

(d.) 10%

(22.)The velocity of transverse wave in a string is $v = \sqrt{\frac{T}{m}}$,where T is the tension in the string and m is mass per unit length. If $T = 3.0$ kgf, mass of string is 2.5 g and length of string is 1.00m, then the percentage error in the measurement of velocity is

(a.) 0.5

(b.) 0.7

(c.) 2.3

(d.) 3.6

(23.)The dimensions of emf in MKS is

(a.) $[ML^{-1}T^{-2}Q^{-2}]$

(b.) $[ML^{-2}T^{-2}Q^{-2}]$

(c.) $[MLT^{-2}Q^{-1}]$

(d.) $[ML^2T^{-2}Q^{-1}]$

(24.)The physical quantity having the dimensions $[M^{-1}L^{-3}A^{2}]$ is

(a.) Resistance

(b.) Resistivity

(c.) Electrical conductivity

(d.) Electromotive force

(25.)What is the dimensional formula of $\frac{\text{planck's constant}}{\text{linear momentum}}$?

(a.) $[M^0L^0T^0]$

(b.) $[M^0L^0T]$

(c.) $[M^0LT^0]$

(d.) $[MLT^{-1}]$

(26.)The constant of proportionality $\frac{1}{4\pi\varepsilon_0}$ in Coulomb's law has the following dimensions

(a.) $C^{-2}Nm^2$

(b.) $C^2N^{-1}m^{-2}$

(c.) C^2Nm^2

(d.) $C^{-2}N^{-1}m^{-2}$

(27.)If force (F), length (L) and time (T) are assumed to be fundamental units, then the dimensional formula of the mass will be

(a.) $FL^{-1}T^2$

(b.) $FL^{-1}T^{-2}$

(c.) $FL^{-1}T^{-1}$

(d.) FL^2T^2

(28.)The position of a particle at time t is given by the relation $x(t) = \left(\frac{v_0}{\alpha}\right)(1 - e^{\alpha t})$, where v_0 is constant and $\alpha > 0$. The dimensions of v_0 and α are respectively

(a.) $M^0L^1T^{-1}$ and T^{-1}

(b.) $M^0L^1T^0$ and T^{-1}

(c.) $M^0L^1T^{-1}$ and LT^{-2}

(d.) $M^0L^1T^{-1}$ and T

(29.)One yard in SI units is equal

(a.) $1.9144\ metre$

(b.) $0.9144\ metre$

(c.) $0.09144\ kilometre$

(d.) $1.0936\ kilometre$

(30.)The magnetic force on a point moving charge is $\vec{F} = q(\vec{V} \times \vec{B})$.

Here, q =electric charge

$\vec{V} =$ velocity of the point charge

$\vec{B}$ =magnetic field

The dimensions of $\vec{B}$

(a.) $[MLT^{-1}A]$

(b.) $[MLT^{-2}A^{-1}]$

(c.) $[MT^{-1}A^{-1}]$

(d.) None of these

(31.)Out of the following four dimensional quantities, which one qualifies to be called a dimensional constant?

(a.) Acceleration due to gravity

(b.) Surface tension of water

(c.) Weight of a standard kilogram mass

(d.) The velocity of light in vacuum

(32.)In an experiment, the following observation's were recorded: $L = 2.820\ m$,

$M = 3.00 kg, l = 0.087\ cm$, diameter $D = 0.041\ cm$. Taking $g = 9.81 m/s^2$ using the formula,

$Y = \frac{4MgL}{\pi D^2 l}$, the maximum permissible error in Y is

(a.) 7.96%

(b.) 4.56%

(c.) 6.50%

(d.) 8.42%

(33.)An object is moving through the liquid. The viscous damping force acting on it is proportional to the velocity. Then dimension of constant of proportionality is

(a.) $ML^{-1}T^{-1}$

(b.) MLT^{-1}

(c.) M^0LT^{-1}

(d.) ML^0T^{-1}

(34.)Which of the following represents a $volt$

(a.) $Joule/second$

(b.) $Watt/ampere$

(c.) $Watt/coulomb$

(d.) $Coulomb/joule$

(35.)Electric displacement is given by $D = \varepsilon E$,

Here, ε =electric permittivity

E =electric field strength

The dimensions of electric displacement are

(a.) $[ML^{-2}TA]$

(b.) $[L^{-2}T^{-1}A]$

(c.) $[L^{-2}TA]$

(d.) None of these

(36.)Dimensions of luminous flux are

(a.) ML^2T^{-2}

(b.) ML^2T^{-3}

(c.) ML^2T^{-1}

(d.) MLT^{-2}

(37.)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

(38.)Dimensions of the following three quantities are the same

(a.) Work, energy, force

(b.) Velocity, momentum, impulse

(c.) Potential energy, kinetic energy, momentum

(d.) Pressure, stress, coefficient of elasticity

(39.)Dimensions of kinetic energy are

(a.) ML^2T^{-2}

(b.) M^2LT^{-1}

(c.) ML^2T^{-1}

(d.) ML^3T^{-1}

(40.)A sextant is used to measure

(a.) Area of hill

(b.) Height of an object

(c.) Breadth of a tower

(d.) Volume of the building