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Instructor: Vikas Sharma Sir

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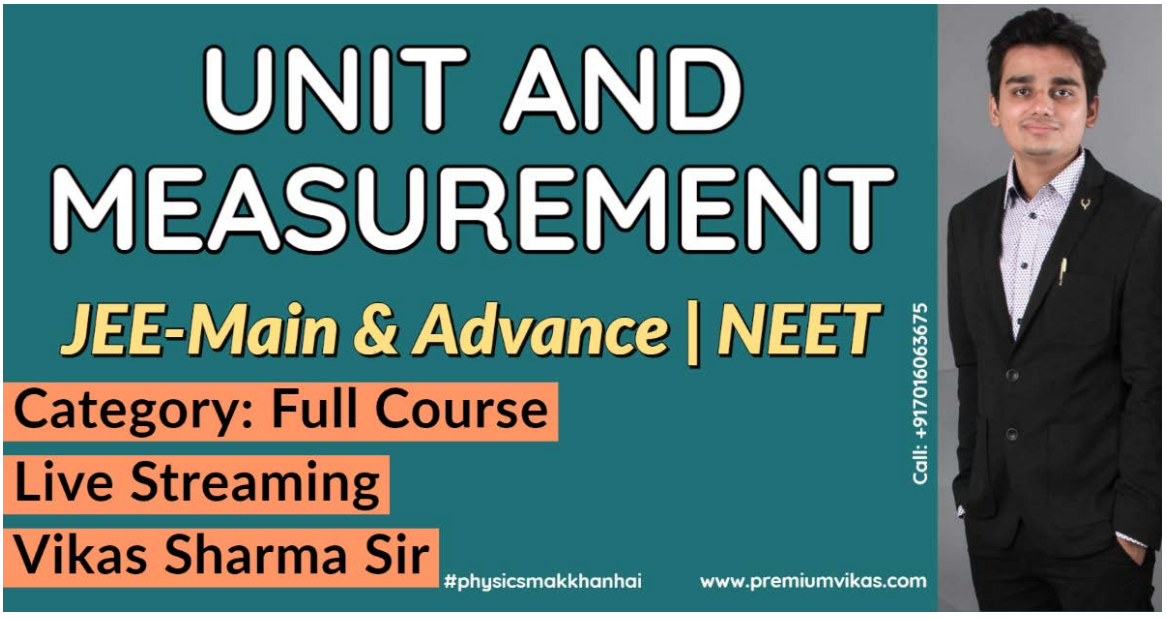

Q.1 The dimensional formula for Planck's constant is

(A) $\left[ML^2T^{-1}\right]$ (B) $\left[ML^2T^3\right]$ (C) $\left[ML^{-1}T^{-2}\right]$ (D) $\left[MLT^{-2}\right]$

Q.2 Turpentine oil is flowing through a tube of length ℓ and radius r. The pressure difference between the two ends of the tube is P; the viscosity of the oil is given by $\eta = \frac{\rho\left(r^2 - x^2\right)}{4v\ell}$ where v is the velocity of oil at a distance x from the axis of the tube. From this relation, the dimensions of viscosity η are

(A) $\left[M^0L^0T^0\right]$ (B) $\left[MLT^{-1}\right]$ (C) $\left[ML^2T^{-2}\right]$ (D) $\left[ML^{-1}T^{-1}\right]$

Q.3 The time dependence of a physical quantity is given by $P=P_0 \exp\left(-\alpha t^2\right)$ [Where α is a constant and t is time]. The constant α

(A) Is dimensionless (B) Has dimensions $[T^{-2}]$

(C) Has dimensions $[T^2]$ (D) Has dimensions of P

Q.4 which of the following quantities can be written in SI units in kg m^2 A^{-2} s^{-3}

(A) Resistance (B) Inductance

(C) Capacitance (D) Magnetic flux

Q.5 If L and R denote inductance and resistance respectively, then the dimensions of L/R is

(A) $\left[M^0L^0T^0\right]$ (B) $\left[M^0L^0T\right]$ (C) $\left[M^2L^0T^2\right]$ (D) $\left[MLT^2\right]$

Q.6 The dimensions of $\left(\frac{1}{2}\right)\in E^2$

($\in_0$: permittivity of free space; E: electric field) is

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

Q.7 Which of the following measurements is most accurate?

(A) 0.005 mm (B) 5.00 mm

(C) 50.00 mm (D) 5.0 mm

Q.8 When 97.52 is divided by 2.54, the correct result is

(A) 38.3937 (B) 38.394

(C) 38.39 (D) 38.4

Q.9 The density of a cube is measured by measuring its mass and the length of its sides. If the maximum error in the measurement of mass and length are 3% and 2% respectively, then the maximum error in the measurement of density is

(A) 9% (B) 7% (C) 5% (D) 1%

Q.10 A physical quantity is represented by $X=M^a L^bT^{-c}$. If percentage error in the measurement of M, L and T are α%, β% and γ% respectively, then total percentage error is

(A) $\left(\alpha a - \beta b + \gamma c\right)\%$ (B) $\left(\alpha a + \beta b + \gamma c\right)\%$

(C) $\left(\alpha a - \beta b - \gamma c\right)\%$ (D) none of the above

Q.11 The volume of a sphere is 1.76 cm^3. The volume of 25 such spheres taking into account the significant figures is

(A) 0.44×10^2 cm^3 (B) 44.0 cm^3

(C) 44 cm^3 (D) 44.00cm^3

Q.12 The measurement of radius of a sphere is $\left(4.22 \pm 2\%\right)$ cm. The percentage error in volume of the sphere is

(A) $\left(315 \pm 6\%\right)$ (B) $\left(315 \pm 2\%\right)$

C) $\left(315 \pm 4\%\right)$ (D) $\left(315 \pm 5\%\right)$

Q.13 In the measurement of n from the formula $n = \frac{2Wg\ell}{\pi r^4 \theta}$, the quantity which should be measured with the best care is

(A) W (B) ℓ (C) r (D) θ

Q.14 When the number 6.03587 is rounded off to the second place of decimals, it becomes

(A) 6.035 (B) 6.04 (C) 6.03 (D) None

Q.15 If the velocity (V) acceleration (A) and force (F) are taken as fundamental quantities instead of mass (M), length (L) and time (T), the dimension of Young's modulus would be

(A) FA^2V^{-2} (B) FA^2V^{-3} (C) FA^2V^{-4} (D) FA^2V^{-5}

Q.16 The number of particles crossing per unit area perpendicular to x- axis in unit time is

$N = -D\frac{n_2 - n_1}{x_2 - x_1}$ where n_1 and n_2 are number of particles per unit volume for x_1 and x_2 respectively. The dimensions of diffusion constant D are

(A) $\left[ML^0T^2\right]$ (B) $\left[M^0L^2T^{-4}\right]$ (C) $\left[M^0LT^{-3}\right]$ (D) $\left[M^0L^2T^{-1}\right]$

Q17 If force, acceleration and time are taken as fundamental quantities, then the dimensions of length will be

(A) FT^2 (B) $F^{-1}A^2T^{-1}$ (C) FA^2T (D) AT^2

Q.18 In a certain system of units, 1 unit of time is 5 sec, 1 unit of mass is 20 kg and unit of length is 10m. In this system, one unit of power will correspond to

(A) 16 watts (B) 1/16 watts

(C) 25 watts (D) None of these

Q.19 While measuring acceleration due to gravity by a simple pendulum, a student makes a positive error of 1% in the length of a pendulum and a negative error of 3% in the time period. His actual percentage error in the measurement of the value of g will be:

(A) 2% (B) 4% (C) 7% (D) 10%

Q.20 A body is moving from height x=0.1 m to x=1.2 in 1 sec under constant acceleration of $0.5m/s^2$. What was the initial velocity with which it started? (Correct to significant digits)

(A) 0.85m/s (B) 0.9 m/s (C) 1.0 m/s (D) 0.8 m/s

Q.21 A quantity y is related to another quantity x by the equation $y=kx^a$ where k and a are constant. If percentage error in the measurement of x is p, then that in y depends upon

(A) K and a (B) x and a

(C) p and a (D) p,k and a all

Q.22 Which of the following quantities has smallest number of significant digits?

(A) 0.00145 cm (B) 14.50 cm

(C) 145.00 cm (D) 145.0×10^{-6} cm

Q.23 $\frac{3.06}{1.2}+1.15$ and express the answer in correct significant digits

(A) 3.70 (B) 3.7 (C) 3.75 (D) 3.8

Q.24 Which of the following pairs don't have same dimensions?

(A) Solid angle and vector

(B) Potential energy and torque

(C) (Area × velocity) and rate of change of volume with time

(D) None of these

Q.25 Which of the following quantities are dimensionless? (Symbols have their usual meaning)

(A) $\frac{I\omega^2}{m\,v\,r}$ (B) $\frac{Gp}{T}$ (C) $\frac{\rho v r}{\eta}$ (D) $\frac{\tau\theta}{I\omega}$

[Useful relation $I=\frac{2}{5}mr^2$, F= $=6\pi\eta rv$]

Q.26 Suppose $A=B^n C^m$, where A has dimensions LT, B has dimensions L^2T^{-1}, and C has dimensions LT^2. Then the exponents n and m have values:

(A) 2/3; 1/3 (B) 2;3 (C) 4/5; -1/5 (D) 1/5; 3/5

Q.27 A uniform wire of length L and mass M is stretched between two fixed points, keeping a tension F. A sound of frequency μ is aimed on it. Then the maximum vibrational energy is existing in the wire when μ =

(A) $\frac{1}{2}\sqrt{\frac{ML}{F}}$ (B) $\sqrt{\frac{FL}{M}}$ (C) $2\times\sqrt{\frac{FM}{L}}$ (D) $\frac{1}{2}\sqrt{\frac{F}{ML}}$

Q.28 The dimension $ML^{-1}T^{-1}$ can correspond to

(A) Moment of a force

(B) Surface tension

(C) Modulus of elasticity

(D) Coefficient of viscosity

Q.29 Which of the following physical quantities represents the dimensional formula $\left[M^1L^{-2}T^{-2}\right]$

(A) Energy/ area (B) Pressure

(C) Force $\times$ length (D) pressure per unit length

Q.30 In a particular system of unit, if the unit of mass become twice & that of time becomes half, then 8 joules will be written as_____ units of work

(A) 16 (B) 1 (C) 4 (D) 64

Q.31 Which of the following is not one of the seven fundamental SI units?

(A) Henry (B) Ampere (C) Candela (D) Mole

Q.32 The dimensional formula for which of the following pairs is not the same

(A) Impulse and momentum

(B) Torque and work

(C) Stress and pressure

(D) Momentum and angular momentum

Q.33 Dimensional formula for coefficient of viscosity (η)[use$F = 6\pi\eta r v$($r =$ radius; $v =$ velocity; $F =$ viscous force]

(A) $ML^{-2}T^{-1}$ (B) $M^{-1}L^1T^{-1}$ (C) $M^1L^1T^{-2}$ (D) $ML^{-1}T^{-1}$

Q34 The time dependence of a physical quantity P is given by $p=p_0 e^{\left(-\alpha t^2\right)}$ where α is constant and t is time. The constant α

(A) Is dimensionless (B) Has dimensions T^{-2}

(C) Has dimensions T^2 (D) Has dimensions of p

Q.35 From the following pairs of physical quantities, in which group dimensions are not same:

(A) Momentum and impulse

(B) Torque and energy

(C) Energy and work

(D) Light year and minute

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