1. A student finds the constant acceleration of a slowly moving object with n stopwatch. The equation used is $S = (1/2)\,AT^2$. The time is measured with n stopwatch, the distance, S with n meter stick. What is the acceleration and its estimated error? S = 2 $\pm$ 0.005 metre., T = 4.2 $\pm$ 0.2 second.
   a) (0.23 $\pm$ 0.02) m/s^2 b) (0.23 $\pm$ 0.03) m/s^2
   c) (0.32 $\pm$ 0.02) m/s^2 d) (0.23 $\pm$ 0.05) m/s^2
2. A body of mass m = 3.513 kg is moving along the x-axis with n speed of 5.00 ms^{-1}. The magnitude of its momentum is recorded as
   a) 17.6 kg ms^{-1} b) 17.565 kg ms^{-1}
   c) 17.56 kg ms $^{-1}$ d) 17.57 kg ms^{-1}
3. The dimensions of $\frac{1}{\mu_o \varepsilon_o}$, where symbols have their usual meaning, are
   a) [L^{-1}T] b) [L^{-2}T^2] c) [L^{2}T^{-2}] d) [LT^{-1}]
4. The physical quantities not having same dimensions are
   a) Torque and work b) Momentum and Planck's constant
   c) Stress and young's modulus d) speed and $(\mu_o\varepsilon_o)^{-1/2}$
5. The error in the measurement of radius of the sphere is 0.3%. What is the permissible error in its surface area?
   a) 0.1% b) 0.2% c) 0.5% d) 0.6%
6. The period of oscillation of a simple pendulum is $2\pi\sqrt{l/g}$. Measured value of 1 is 20.0 cm known to 1 mm accuracy and time for 100 oscillations of the pendulum is found to be 90 s using a wrist watch of 1.s resolution. What is the percentage error in the determination of g?
   a) 3% b) 5% c) 7% d) 4%
7. To find the value of g using simple pendulum, T = 2.00 sec, ℓ = 50 cm, was measured. The maximum permissible error in g is, (Errors in T = 0.01 sec, ℓ = 0.1 cm)
   a) 1.4% b) 1.1% c) 1.5% d) 1.2%
8. Let $y = \ell^2 - \frac{\ell^3}{z}$ where ℓ = 2.0 $\pm$ 0.1, z = 1.0 $\pm$ 0.1 then the value of y is given by
   a) + 2 $\pm$ 0.8 b) – 4 $\pm$ 1.6 c) – 4 $\pm$ 0.8 d) None of these
9. The heat generated in a circuit is given by $H = I^2Rt$ joule where I is current, R is resistance and t is time. If the percentage errors in measuring I, R and t are 2%, 1% and 1% respectively. The maximum error in measuring heat will be
   a) 2% b) 3% c) 4% d) 6%

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10. The length of a cylinder is measured with a metre rod having least count 0.1 cm. Its diameter is measured with vernier callipers having least count 0.01 cm. Given that length is 5.0 cm and radius is 2.00 cm. The percentage error in the calculated value of the volume will be
a) 11% b) 2% c) 3% d) 4%

11. A spherical body of mass m and radius r is allowed to fall in a medium of Viscosity η. The time in which the velocity of the body increases from zero to 0.63 times, the terminal velocity (v) is called time constant (τ). Dimensionally τ 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 these

12. The moment of inertia of a body rotating about a given axis is 6.0 kg m2 in the SI system. What is the value of the moment of inertia in a system of units in which the unit of length is 5 cm and the unit of mass is 10 g?
a) 2.4 x 10^3 g cm^2 b) 2.4 x 10^5 g cm^2
c) 6.0 x 10^3 g cm^2 d) 6.0 x 10^5 g cm^2

13. 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) $[AT^2]$

14. The frequency (f) of a wire oscillating with a length ℓ, in p loops, under a tension T is given by $f = \frac{p}{2\ell}\sqrt{\frac{T}{\mu}}$ where μ = linear density of the wire. If the error made in determining what is the percentage error in the calculated frequency.
a) –4% b) 4% c) –6% d) –6%

15. A certain body weighs 22.42 gm and has a measured volume of 4.7 cc. The possible error in the measurement of mass and volume are 0.01 gm and 01. cc. Then maximum error in the density will be
a) 22% b) 2% c) 0.2% d) 0.02%

16. Wave pulse can travel along a tense string like a violin spring. A series of experiments showed that the wave velocity V of a pulse depends on the following quantities, the tension T of the string, the cross- section area A of the string and then as per unit volume ρ of the string. Obtain an expression for V in terms of the T, A and ρ using dimensional analysis.
a) $V = k\sqrt{\frac{T}{A\rho}}$ b) $V = k\sqrt{\frac{T}{A}}$ c) $V = k\sqrt{\frac{A\rho}{T}}$ d) None of these

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17. Value of acceleration due to gravity is 9.8 m/sec^2. Find its value in km/hr^2
a) 127008 km/h^2 b) 227008 km/hr^2 c)157008km/hr^2
d) None of these

18. In the formula; $N = -D\left[\frac{n_2 - n_1}{x_2 - x_1}\right]$,

D = diffusion coefficient, n_1 and n_2 are number of molecules in unit volume along x_1 and x_2 which represents distances where N is number of molecules passing through per unit area per unit time. Calculate dimensions of D.
a) $[L^2T^{-1}]$ b) $[T^{-1}L^{-1}]$ c) $[L^2T^2]$ d) $[L^2T^1]$

19. If $T = 2\pi\sqrt{\frac{ML^3}{3\,Yq}}$ then find the dimensions of q. Where T is the time period of bar of mass M, length L and Young's modulus Y.
a) [L] b) $[L^2]$ c) $[L^4]$ d) $[L^3]$

20. The SI unit of the inductance, the henry cannot be written as
a) weber/ampere b) volt-second/ampere
c) Joule/(ampere)^2 d) ohm-metre

21. The dimensions of electrical resistance are
a) $[ML^2T^{-2}A^2]$ b) $[ML^2T^{-3}A^{-2}]$ c) $[ML^2T^{-3}A^2]$ d) $[ML^2T^{-2}A^{-2}]$

22. 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) $\frac{x}{(n-1)}$

23. Two full turns of the circular scale of a screw gauge cover a distance of 1mm on its main scale. The total number of divisions on the circular scale is 50. Further, it is found that the screw gauge has a zero error of – 0.03 mm. While measuring the diameter of a thin wire, a student notes the main scale reading of 3 mm and the number of circular scale divisions in line with the main scale as 35. The diameter of the wire is
a) 3.32 mm b) 3.73 mm c) 3.67 mm
d) 3.38 mm

24. In an experiment the angles are required to be measured using an instrument 29 divisions of the main scale exactly coincide with the 30 divisions of the Vernier scale. If the smallest division of the main scale is half-a degree (= 0.5^o), then the least count of the instrument is
a) half minute b) one degree c) half degree d) one minute

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25. A laser light beamed towards the moon from earth takes 2.56 s to return after reflection at the moon's surface. How much is the radius of the lunar orbit around the earth?
a) 7.94×10^8 m b) 6.84 x 108 m c) 2.84×10^8 m
d) 3.84×10^8 m

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