Yakeen NEET 2.0 2026

Units and Measurements

Physics by Manish Raj Sir

Assignment-04
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1. A wave function expressing the displacement (γ) as a function of its position (x) ad time (t) is given as $Y = P \log (Qx + Rt)$. Which of the following expressions has dimensions different from other?

(1) λR (2) PR

(3) $\frac{R}{Q}$ (4) QR

2. The value of 120 joule per second on a system that has 10^1 g, 10^2 cm and 10^3 second as base unit is

(1) 12×10^{10} unit

(2) 12×10^{12} unit

(3) 12×10^{14} unit

(4) 12×10^{16} unit

3. If the unit of force is 10 N, the unit of acceleration is 2 m/s^2 and unit of velocity is 5 m/s, then the unit of momentum is

(1) 10 kg m/s (2) 15 kg m/s

(3) 25 kg m/s (4) 30 kg m/s

4. The values of two resistors are $R_1 = (6 \pm 0.3)\ k\Omega$ and $R_2 = (10 \pm 0.2)\ k\Omega$. The percentage error in the equivalent resistance when they are connected in parallel is

(1) 5.125% (2) 2%

(3) 3.875% (4) 7%

5. Choose the correct statement

(1) If a formula is dimensionally correct then it must be physically correct.

(2) Dimensionally wrong formula is physically wrong.

(3) Physically correct formula may be dimensionally incorrect

(4) A dimensionless quantity will never have unit.

6. If main scale division of screw gauge is 1 mm and there 100 division on circular scale, then least count of screw gauge is

(1) 0.1 mm (2) 0.01 mm

(3) 0.01 cm (4) 0.001 m

7. The length of a rectangular plate is measured by a meter scale and is found to be 10.0 cm. Its width is measured by Vernier callipers as 1.00 cm. The least count of the meter scale and Vernier callipers are 0.1 cm and 0.01 cm respectively. Maximum permissible error is area measured is

(1) ± 0.2 cm^2 (2) ± 0.1 cm^2

(3) ± 0.3 cm^2 (4) zero

8. The error in the measurement of radius of a sphere is 2%, then the error in determination of volume of the sphere will be

(1) 8% (2) 2%

(3) 4% (4) 6%

9. A small metallic ball moves through a fluid with a speed v in downward direction, experiences a force F which acts in upwards direction. Experimentally, the magnitude of this force depends on radius 'r' of ball, velocity 'v' of ball and viscosity 'η' of fluid. The correct relation between F, r, v and η is given by

(1) $F \propto \eta r v$ (2) $F \propto \eta^2 r v$

(3) $F \propto \eta r^{-2} v$ (4) $F \propto \eta^{-1} r^{-1} v^{-1}$

10. The number of significant figures in all the measured value 25.12, 200.9, 4.156 and 1.217×10^{-4} is

(1) 1 (2) 2

(3) 3 (4) 4

11. In a vernier calliper, 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

(1) $\left(\frac{n-1}{n}\right)x$ (2) $\frac{nx}{n-1}$

(3) $\frac{x}{n}$ (4) $\frac{x}{n-1}$

12. A student measured the length of a rod and wrote it as 3.50 cm. Which instrument did he use to measure it?

(1) A meter scale with least count 0.1 cm

(2) A vernier calliper where the 10 divisions in vernier scale matches with 9 divisions in main scale and main scale has 10 divisions in 1 cm

(3) A screw gauge having 100 divisions in the circular scale and pitch as 1 mm

(4) A screw gauge having 50 divisions in the circular scale and pitch as 1 mm

13. The numbers 2.745 and 2.735 on rounding off to 3 significant figures will give

(1) 2.75 and 2.74 (2) 2.74 and 2.73

(3) 2.75 and 2.73 (4) 2.74 and 2.74

14. You measure two quantities as $A = 1.0\text{ m} \pm 0.2\text{ m}$, $B = 2.0\text{ m} \pm 0.2\text{ m}$. We should report correct value for $\sqrt{AB}$ is

(1) $1.4\text{ m} \pm 0.4\text{ m}$ (2) $1.41\text{ m} \pm 0.15\text{ m}$

(3) $1.4\text{ m} \pm 0.3\text{ m}$ (4) $1.4\text{ m} \pm 0.2\text{ m}$

15. True value of length of a wooden stick is 38.762 cm. Its length is measured by using two different instruments of different least count. Measurement results are 38.763 cm and 38.76 cm respectively. Which of the following options is correct?

(1) 38.76 cm is more accurate and less precise

(2) 38.763 cm is more accurate and more precise

(3) 38.763 cm is more accurate and less precise

(4) 38.76 cm is less accurate and more precise

16. In an experiment the angles are required to be measured using an instrument whose 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°) then the least count of the instrument is

(1) One minute (2) Half minute

(3) One degree (4) Half degree

17. In a system of units in which the unit of mass is a kg, unit of length is b metre and the unit of time is c second, the magnitude of a calorie is

(1) $\frac{4.2c}{ab^2}$ (2) $\frac{4.2c^2}{ab^2}$

(3) $\frac{abc}{4.2}$ (4) $\frac{4.2}{abc}$

18. Select from the following that is true.

Given $[q] = [ML^{-1}T^{-1}]$

[Here v, A and t represent velocity, area and time respectively]

(1) $q = A\frac{dv}{dt}$ (2) $q = A\frac{dt}{dv}$

(3) $q = \frac{1}{A}\frac{dv}{dt}$ (4) None of these

19. Evaluate 88.956 cm – 78.8 cm

(1) 10.2 cm (2) 10.15 cm

(3) 10.156 cm (4) 10 cm

20. If in a hypothetical system, the unit of velocity is 4 m/s, the unit of acceleration is 24 m/s^2 and the unit of force is 6 N, then the unit of energy is

(1) 4 J (2) 6 J

(3) 8 J (4) 10 J

21. The kinetic energy of a particle varies according to relation $K = \frac{Av^2}{(B+x^2)}$. Here x is the distance and v is the velocity. The dimensional formula of AB is

(1) $[ML^3T^0]$ (2) $[ML^4T^0]$

(3) $[ML^4T^1]$ (4) $[M^2L^3T^0]$

22. If $A = \int_{x_1}^{x_2} \frac{dx}{B - x}$; where x represents position and A and B are unknown quantities, then dimensions of $\left(\frac{A}{B}\right)$ are

(1) $[M^0LT^0]$ (2) $[M^0L^0T^0]$

(3) $[M^0L^{-1}T^0]$ (4) $[M^0L^2T^0]$

23. How many significant figures are there in the value 2.50×10^{10}m?

(1) 2 (2) 3

(3) 4 (4) 5

24. Length of one division on main scale of vernier calliper is 0.1 cm. If 10 division of vernier scale coincides with the 9 divisions of the main scale, find least count

(1) 0.01 cm (2) 0.1 cm

(3) 0.02 cm (4) 0.002 cm

25. Time period T of a small drop of liquid (due to surface tension) depends on density σ, radius r and surface tension s. The relation is

(1) $T \propto \left(\frac{\rho r^3}{s}\right)^{1/2}$ (2) $T \propto \rho rs$

(3) $T \propto \frac{\rho r}{s}$ (4) $T \propto \frac{s}{\rho r}$

26. A vernier callipers has 1 mm marks on the main scale. It has 20 equal divisions on the vernier scale which match with 16 main scale divisions. For this vernier callipers, the least count is,

(1) 0.02 mm (2) 0.05 mm

(3) 0.1 mm (4) 0.2 mm

27. If error in measurement of speed is 50% then find % error in kinetic energy. (mass is constant)

(1) 150% (2) 100%

(3) 50% (4) No error

28. A screw gauge gives the following readings when used to measure the diameter of a wire

Main scale reading: 0 mm

Circular scale reading: 52 divisions

Given that 1 mm on main scale corresponds to 100 divisions on the circular scale. The diameter of the wire from the above data is: **[2021]**

(1) 0.026 cm (2) 0.26 cm

(3) 0.052 cm (4) 0.52 cm

29. A screw gauge has least count of 0.01 mm and there are 50 divisions in its circular scale.

The pitch of the screw gauge is: **[2020]**

(1) 0.25 mm (2) 0.5 mm

(3) 1.0 mm (4) 0.01 mm

30. A student measured the diameter of a small steel ball using a screw gauge of least count 0.001 cm. The main scale reading is 5 mm and zero of circular scale division coincides with 25 divisions above the reference level. If screw gauge has a zero error of –0.004 cm, the correct diameter of the ball is

[MR*] (2018)

(1) 0.053 cm (2) 0.525 cm

(3) 0.521 cm (4) 0.529 cm

31. The density of a cube is measured by measuring its mass and length of its sides. If the maximum error in the measurement of mass and lengths are 3% and 2% respectively, the maximum error in the measurement of density would be: **[1996]**

(1) 12% (2) 14%

(3) 7% (4) 9%

32. Percentage errors in the measurement of mass and speed are 2% and 3% respectively. The error in the estimate of kinetic energy obtained by measuring mass and speed will be: **[1995]**

(1) 8% (2) 2%

(3) 12% (4) 10%

33. A certain body weighs 22.42 g and has a measured volume of 4.7 cc. The possible, error in the measurement of mass and volume are 0.01 g and 0.1 cc. Then maximum error in the density will be:

[MR*] (1991)

(1) 22%

(2) 2%

(3) 0.2%

(4) 0.02%

34. The errors in the measurement which arise due to unpredictable fluctuations in temperature and voltage supply are: **[2023]**

(1) Random errors

(2) Instrumental errors

(3) Personal errors

(4) Least count errors

35. A metal wire has mass (0.4 ± 0.002) g, radius (0.3 ± 0.001) mm and length (5 ± 0.02) cm. The maximum possible percentage error in the measurement of density will nearly be: **[2023]**

(1) 1.4% (2) 1.2%

(3) 1.3% (4) 1.6%

36. The percentage error in the measurement of g is:

(Given that $g = \frac{4\pi^2 L}{T^2}$, L (10 ± 0.1) cm, $T = (100 \pm 1)$s) **(2022 Re)**

(1) 7% (2) 2%

(3) 5% (4) 3%

37. The intervals measured by a clock given the following readings: 1.25 s, 1.24 s, 1.27 s, 1.21 s and 1.28 s. What is the percentage relative error in the observations? **(2020-Covid)**

(1) 4% (2) 16%

(3) 1.6% (4) 2%

38. A screw gauge gives the following reading when used to measure the diameter of a wire.

Main scale reading: 0 mm

Circular scale reading: 52 divisions

Given that 1 mm on main scale corresponds to 100 divisions of the circular scale.

The diameter of wire from the above data is

[AIEEE 2011]

(1) 0.52 cm (2) 0.052 cm

(3) 0.026 cm (4) 0.005 cm

39. The density of a solid ball is to be determined in an experiment. The diameter of the ball is measured with a screw gauge, whose pitch is 0.5 mm and there are 50 divisions on the circular scale. The reading on the main scale is 2.5 mm and that on the circular scale is 20 divisions. If the measured mass of the ball has a relative error of 2%, the relative percentage error in the density is **[IIT-JEE 2011]**

(1) 0.9% (2) 2.4%

(3) 3.1% (4) 4.2%

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

[AIPMT 2014]

(1) $[FV\ T^{-2}]$

(2) $[FV^{-1}\ T^{-1}]$

(3) $[FV\ T^{-1}]$

(4) $[FV^{-1}\ T]$

41. 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 error in measurement of the distance and the time are e_1 and e_2, respectively, the percentage error in the estimation of g is

(1) $e_2 - e_1$ (2) $e_1 + 2e_2$

(3) $e_1 + e_2$ (4) $e_1 - 2e_2$

42. The heat generated in a circuit is given by $Q = I^2 Rt$, where I is current, R is resistance and t is time. If errors in measuring current, resistance and time are 2%, 1% and 1%, respectively, the maximum error in measuring heat will be

(1) 2% (2) 4%

(3) 6% (4) 8%

43. The period of oscillation of a simple pendulum is given by $T = 2\pi\sqrt{\frac{l}{g}}$, where l is about 100 cm and is known to have 1 mm accuracy. The period is about 2s. The time of 100 oscillations is measured by a stop watch of least count 0.1 s. The percentage error in g is **[BHU 2006]**

(1) 0.1% (2) 1%

(3) 0.2% (4) 0.8%

44. If the orbital velocity of a planet is given by $v = G^a M^b R^c$, then

(1) $a = \frac{1}{3}, b = \frac{1}{3}, c = -\frac{1}{3}$

(2) $a = \frac{1}{2}, b = \frac{1}{2}, c = -\frac{1}{2}$

(3) $a = \frac{1}{2}, b = -\frac{1}{2}, c = \frac{1}{2}$

(4) $a = \frac{1}{2}, b = -\frac{1}{2}, c = -\frac{1}{2}$

45. The period T of a soap bubble under SHM is given by $T = P^a D^b S^c$, where P is pressure, D is density and S is surface tension. Then the values of a, b and c are

(1) $-\frac{3}{2}, \frac{1}{2}, 1$ (2) $-1, -2, 3$

(3) $\frac{1}{2}, -\frac{3}{2}, -1/2$ (4) $1, 2, \frac{3}{2}$

46. A gas bubble from an explosion under water oscillates with a period T proportional to $P^a d^b E^c$, where P is the static pressure, d is the density of water and E is the total energy of the explosion. The values of a, b and c are

(1) $-\frac{1}{2}, \frac{1}{2}, -\frac{1}{3}$ (2) $-\frac{5}{6}, \frac{1}{2}, \frac{1}{3}$

(3) $\frac{5}{6}, -\frac{1}{2}, \frac{1}{3}$ (4) $-\frac{5}{6}, -\frac{1}{2}, \frac{1}{3}$

47. The velocity of water wave v may depend on their wavelength λ, the density of water ρ and the acceleration due to gravity g. The method of dimensions gives the relation between these quantities as

(1) $v^2 \propto \lambda g \rho$ (2) $v^2 \propto \lambda^{-1} g^{-1} \rho^{-1}$

(3) $v^2 \propto g \lambda$ (4) $v^2 \propto \rho \lambda$

ANSWER KEY

1.	(4)	17.	(2)	33.	(2)
2.	(2)	18.	(4)	34.	(1)
3.	(3)	19.	(1)	35.	(4)
4.	(3)	20.	(1)	36.	(4)
5.	(2)	21.	(2)	37.	(3)
6.	(2)	22.	(3)	38.	(2)
7.	(1)	23.	(2)	39.	(3)
8.	(4)	24.	(1)	40.	(4)
9.	(1)	25.	(1)	41.	(2)
10.	(4)	26.	(4)	42.	(3)
11.	(3)	27.	(2)	43.	(3)
12.	(2)	28.	(3)	44.	(3)
13.	(4)	29.	(2)	45.	(1)
14.	(4)	30.	(4)	46.	(4)
15.	(2)	31.	(4)	47.	(3)
16.	(1)	32.	(1)		

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