Physics Objective Questions – Typical

{Each question is tagged with Level and Type SC (Single Choice) or MC Multiple Choice)}

No of Question: 51] **[Time Allotted: 90 Mimutes**

(All questions are compulsory)

1. Dimension of Surface Tension expressed by $S = \frac{\rho g r h}{2}$ is
   (a) LMT^{-2} (b) MT^{-2} (c) LT^{-2} (d) LM

2. Dimension of Thermal Conductivity(k) in formula $Q = k\frac{A(\theta_2-\theta_1)t}{d}$ is –
   (a) LMT^{-2} (b) MT^{-2} (c) $MLT^{-3}K^{-1}$ (d) $MLT^{-2}K^{-1}$

3. Dimension of Capacitance (C) $Q = CV$ is –
   (a) $M^{-1}L^{-2}T^4I^2$ (b) $ML^{-2}T^4I^2$ (c) $M^{-1}L^{-1}T^4I^2$ (d) $M^{-1}L^{-2}T^4I^1$

4. Conversion factor for unit of Young's Modulus in SI is (N/m^2) into CGS ($dynes/cm^2$) is –
   (a) 10^9 (b) 10^3 (c) 10^6 (d) 10

5. Distance covered by a particle expressed as $y = ax + bt + ct^2$, where y is distance along Y-axis, x is distance along X-axis, a, b and c are coefficients and t is time elapsed. Then dimensions of $a, b,$ and c are –
   (a) [a] is dimensionless , $[b] = LT^{-1}, [c] = LT^{-2}$
   (b) $[a] = L,\ [b] = LT^{-1}, [c] = LT^{-2}$
   (c) $[a] = LT,\ [b] = LT^{-2}, [c] = LT^{-3}$
   (d) $[a] = L,\ [b] = LT,\ [c] = LT^{-1}$

6. Electric current through a wire produces heat (H) which is a function of current (I) through it, resistance of wire (R)and time (t) for which current is passed the wire. This function is expressed as $= kI^aR^bt^c$, here k is dimensionless proportionality constant. Then , values of indices are –
   (a) $a = 2, b = 1, c = 1$
   (b) $a = 2, b = 2, c = 1$
   (c) $a = 1, b = 2, c = 1$
   (d) $a = 1, b = 1, c = 2$

7. In expression $\int \frac{dx}{\sqrt{ax-x^2}} = k\sin^{-1}\left(\frac{x}{a}-1\right)$, on R.H.S. k is dimensionless, dimension $[a]$ is –
   (a) Dimensionless (b) L (c) L^2 (d) L^{-1}

8. Dimensionally $ML^{-1}T^{-2}$ is –

(a) Linear momentum (b) Work done by a force
(c) Energy per unit area (d) Pressure

9. Identify correct statements –

(a) In dimensional analysis each quantity in expression is in terms of base quantities,
(b) Every base quantity is independent of other base quantities
(c) Two base cannot be related
(d) Dimension of a derived quantity may be zero

10. Duration of journey from Noida to Gurgaon is 90 minutes. If $1\ \text{milli}-\text{century} = 10^{-3}\text{Century}$, express duration of travel in $\text{milli}-\text{century}$

(a) $28.538\text{E}-05\ \text{milli}-\text{centuries}$
(b) $28.5\text{E}-05\ \text{milli}-\text{centuries}$
(c) $28\text{E}-05\ \text{milli}-\text{centuries}$
(d) $28.53\text{E}-05\ \text{milli}-\text{centuries}$

11. Period of oscillation of a simple pendulum is $T = 2\pi\sqrt{\frac{l}{g}}$. Measured value of $l = 20.0 \pm 0.1$ cm and time for 100 oscillations is $t = 90 \pm 1$ sec. Accuracy of the value of g determined so is –

(a) 2% (b) 3% (c) 1% (d)2.5%

12. Unit of heat is Calorie is equal 4.2 J. In a another system of unit mass is $= x$ kg, unit length is $= y$ m and time is $= z$ s. Then One Calorie equivalent to new unit of Energy (U)-

(a) $\frac{1}{4.2}xy^2z^{-2}$ (b) $4.2x^1y^2z^{-2}$ (c) $4.2x^{-1}y^2z^2$ (d) $\boldsymbol{4.2x^{-1}y^{-2}z^2}$

13. In electrical circuit dimension of $\left[\frac{L}{C}\right]$ is-

(a) $\left[\frac{1}{R}\right]^2$ (b) $[\boldsymbol{R}]^{\boldsymbol{2}}$ (c) Dimensionless (d) $[R]$

14. Dimension $\left[\frac{h}{e}\right]$, where, h is Planck's Constant and e is charge of an electron, is –

(a) Electric Flux (b) Electric Field (c) Magnetic Field (d) Magnetic Flux

15. Dimension $\left[\frac{E^2}{\mu_o}\right]$, where E is electric field and μ_o is permeability of free space is –

(a) MLT^{-4} (b) $M^2L^{-3}T^2A$ (c) $M^2L^{-3}T^2A^2$ (d) ML^3T^{-2}

16. When L is angular momentum and μ is magnetic moment then $\left[\frac{L}{\mu}\right]$ is -

(a) $MLT^{-1}I^{-1}$ (b) $ML^{-1}T^{-1}I^{-1}$ (c) $MT^{-1}I^{-1}$ (d) $T^{-1}I^{-1}$

17. When, e is charge of an electro, ε_0 is permittivity of free space, h is Planck's Constant and c is velocity of light then dimensionally $\left[\frac{e^2}{\varepsilon_o hc}\right]$ is –

(a) $MT^{-1}I^{-1}$ (b) Dimensionless (c) ML^2I^{-1} (d) $MLT^{-1}I^{-1}$

18. Dimension $[\sigma b^4]$, where σ is Stephen's constant and b is Wein's is –
(a) Dimensionless (b) ML^2T^{-3} (c) ML^4T^{-1} (d) ML^4T^{-3}

19. Dimensionally $\left[\frac{CV}{\rho\varepsilon_o}\right]$, where C is capacitance, V is potential difference, ρ is specific resistivity and ε_o is permeability of free space, is –
(a) I (b) $MT^{-1}I^{-1}$ (c) $MLT^{-1}I^{-1}$ (d) $MLT^{-1}I$

20. Dimensionally $[\hbar c]$ is-
(a) MLT^{-2} (b) ML^3T^{-1} (c) ML^3T^{-2} (d) ML^2T^{-2}

21. A 2m long wire of diameter 0.4 ± 0.01 mm suspends a mass of 1 kg, wire. The elongation in wire is measured to be 0.8 ± 0.05. Young's Modulus of elasticity calculated with these observations is -
(a) $(0.2 \pm 0.03) \times 10^{11}$ N/m² (b) $(0.2 \pm 0.022) \times 10^{11}$ N/m²
(c) $(0.2 \pm 0.02) \times 10^{11}$ N/m² (d) $(0.2 \pm 0.0224) \times 10^{11}$ N/m²

22. In a meter bridge determination of value of an unknown resistance X is obtained by adjusting R in resistance box to values R_1, R_2, R_3 and R_4, arranged in an incremental order. In the process position of Galvanometer contact is kep unchanged. The most accurate approximation of value of X using any Two values is -
(a) $R_2\ \Omega$ (b) $R_3\ \Omega$ (c) $\frac{R_2+R_3}{2}\ \Omega$ (d) $\frac{R_1+R_2+R_3+R_4}{4}\ \Omega$

23. A screw gauge with 100 divisions on circular scale has a pitch of 1 mm. Diameter of a wire is measured to be 2 mm and 49th division of circular scale on reference line. If length of wire is 6.5 cm its surface area of the curved surface is -
(a) 51 cm² (b) 50.8 cm² (c) 50.83 cm² (d) 50.829 cm²

24. Identify a pair of physical quantity among those given below which are dimensionally different (i) Torque and work, (ii) Momentum and Planck's Constant, (iii) Stress and Young's Modulus and (iv) $\varepsilon_o\mu_o$ and $\frac{1}{\text{Speed}}$
(a) Torque and work (b) Momentum and Planck's
(c) Stress and Young's Modulus (d) $\varepsilon_o\mu_o$ and $\frac{1}{\text{Speed}^2}$

25. Significant digits in numbers 23000, 23.000, 02030.0 are -
(a) 5, 6,6 (b) 6, 2,3 (c) 2, 5, 5 (d) 2, 6, 4

26. Absolute of permittivity of free space (ε_o) has unit in SI -
(a) Farad per meter (b) Farad-meter (c) Farad (d) Farad-meter-square

27. Unit of gravitational constant is -
(a) kg-m/s (b) kg-m/s² (c) kg-m/s² (d) N-m²/kg²

28. In $x(t) = \frac{v_0}{\alpha}(1 - e^{-\alpha t})$, position of a particle is $x(t)$, a function of (t), then dimensions of v_0 and α are -

(a) $\mathbf{LT^{-1}}$, $\mathbf{T^{-1}}$ (b) LT^2, T (c) LT, T^2 (d) LT^2, T^2

29. In diffusion process number of particles crossing per unit area and per unit time in Y-Z plane is $= -D\frac{n_2 - n_1}{x_2 - x_1}$. Here, n_1 and n_2 are number of diffusing molecules per unit volume at points x_1 and x_2 along X-axis. Then dimension of diffusion constant D is -

(a) T^{-1} (b) L^3T^{-1} (c) LT^{-1} (d) L^2T^{-1}

30. In a physical quantity $P = \frac{B^2 l^2}{m}$, where B is magnetic induction, l is length and m is mass, then dimension of P is -

(a) $MLT^{-3}A^{-2}$ (b) $ML^2T^{-3}A^{-2}$ (c) $MLT^{-2}A^{-2}$ (d) $MLT^{-2}A^{-1}$

31. Taking Velocity of light (c), gravitational constant (G) and Planck's constant (h) as fundamental units, then dimension of mass in new system is -

(a) $c^{-\frac{1}{2}}G^{-\frac{1}{2}}h^{\frac{1}{2}}$ (b) $c^{\frac{1}{2}}G^{-\frac{1}{2}}h^{\frac{1}{2}}$ (c) $c^{\frac{1}{2}}G^{-\frac{1}{2}}h^{-\frac{1}{2}}$ (d) $c^{-\frac{1}{2}}G^{\frac{1}{2}}h^{-\frac{1}{2}}$

32. A body weighs is air (5.00 ± 0.5) N and in water (4.00 ± 0.5) N. What is the percentage error in relative density of body -

(a) 9% (b) 10% (c) 5% (d)11%

33. A box weighing 5.2 kg is containing three balls each weighing 200 gm, 330.5 gm and 75 gm. Total mass of the box with three balls is -

(a) 5.9 (b) 5.950 (c) 6.0 (d) 6

34. Potential difference across a resistance of 15.479 Ω, when 3.56 Amps current flows through it would be -

(a) 44.10 V (b) 55.1 V (c) 55 V (d) 55.105 V

35. If each of parameter in a physical quantity is measured to 1% accuracy then maximum error caused in a physical quantity $X = \frac{P^{\frac{2}{3}}Q^2}{RS^{\frac{5}{2}}}$ is due to -

(a) P (b) S (c) Q (d) R

36. Number of base or fundamental SI units is -

(a) 4 (b) 7 (c) 3 (d) 5

37. The unit of Planck's constant is -

(a) *Joule* (b) *Joule*/s (c) *Joule*/*m* (d) *Joule- s*

38. The unit of reactance is -

(a) *Ohm* (b) *Volt* (c) *Mho* (d) *Newton*

39. The dimension of $\frac{R}{L}$ are -

(a) T^2 (b) T (c) T^{-1} (d) T^{-2}

40. Dimensions of potential energy are -

(a) MLT^{-1} (b) ML^2T^{-2} (c) $ML^{-1}T^{-2}$ (d) $ML^{-1}T^{-1}$

41. The dimensions of electric potential are -

(a) $ML^2T^{-2}Q^{-1}$ (b) $ML^2T^{-2}Q^{-1}$ (c) $ML^2T^{-1}Q$ (d) $ML^2T^{-2}Q$

42. The dimensional formula for Boltzmann's constant in Kinetic Theory of Gases is -

(a) $ML^2T^{-2}\theta^{-1}$ (b) ML^2T^{-2} (c) $ML^0T^{-2}\theta^{-1}$ (d) $ML^2T^{-2}\theta^{-1}$

43. Which of the following quantities is dimensionless -

(a) Gravitational constant (b) Planck's constant

(c) Power of a convex lens (d) None of these

44. Which of the two have same dimensions -

(a) Force and strain (b) Force and stress

(c) Angular velocity and frequency (d) Energy and strain

45. The dimensions of pressure is equal to -

(a) Force per unit volume (b) Energy per unit volume

(c) Force (d) Energy

46. Identify the pair whose dimensions are equal

(a) Torque and work (b) Stress and energy

(c) Force and stress (d) Force and work

47. A physical quantity x depends on quantities y and z as follows: $x = Ay + B\tan Cz$, where A, B and C are constants. Which of the following do not have the same dimensions

(a) x and B (b) C and z^{-1} (c) y and B/A (d) x and A

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

(a) Resistivity (b) Conductivity (c) Resistance (d) None of these

49. 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 of these

50. Let $[\varepsilon_0]$ denotes the dimensional formula of the permittivity of the vacuum and $[\mu_0]$ that of the permeability of the vacuum. If M = mass, L= length, T= time and I= electric current, then

(a) $[\varepsilon_0] = M^{-1}L^{-3}T^2I$ (b) $[\varepsilon_0] = M^{-1}L^{-3}T^4I^2$

(c) $[\mu_0] = MLT^{-2}I^{-2}$ (d) $[\mu_0] = ML^2T^{-1}I$

51. The dimension of quantity (L/RCV) is -

(a) A (b) A^2 (c) A^{-1} (d) None of these