1. The dimension of magnetic field in M, L, T and C (Coulomb) is given as
   a) MT^2C^{-2} b) $MT^{-1}C^{-1}$ c) $MT^{-2}C^{-1}$ d) $MLT^{-1}C^{-1}$
2. Let $[\in_0]$ denote the dimensional formula of the permittivity of vacuum. If M = mass, L = length, T = time and A = electric current, then :
   a) $[\in_0] = [M^{-1}L^{-3}T^2A]$ b) $[\in_0] = [M^{-1}L^{-3}T^4A^2]$
   c) $[\in_0] = [M^{-1}L^2T^{-1}A^{-2}]$ d) $[\in_0] = [M^{-1}L^2T^{-1}A]$
3. The respective number of significant figures for the numbers 23.023, 0.0003 and 2.1×10^{-3} are
   a) 5, 1, 2 b) 5, 1, 5 c) 5, 5, 2 d) 4, 4, 2
4. The period of oscillation of a simple pendulum is $T = 2\pi\sqrt{\frac{L}{g}}$. Measured value of L is 20.0 cm known to 1mm accuracy and time for 100 oscillations of the pendulum is found to be 90 s using a wrist watch of 1 s resolution. Te accuracy in the determination of g is
   a) 3% b) 1% c) 5% d) 2%
5. A student measures the time period of 100 oscillations of a simple pendulum four times. The data set is 90s, 91s, 95s and 92s. If the minimum division in the measuring clock is 1s, then the reported mean time should be :
   a) 92 ± 5.0s b) 92 ± 1.8s c) 92 ± 3s d) 92 ± 2s
6. Which two of the following five physical parameters have the same dimensions?
   A) Energy density B) Refractive index C)Dielectric constant
   D) Young's modulus E) Magnetic field
   a) (A) and (E) b) (B) and (D) c) (C) and (E)
   d) (A) and (D)
7. If the error in the measurement of radius of a sphere is 2%, then the error in the determination of volume of the sphere will be –
   a) 2% b) 4% c) 6% d) 8%
8. If the dimensions of a physical quantity are given by $M^aL^bT^c$, then the physical quantity will be :
   a) Velocity if a = 1, b = 0, c = –1 b) Acceleration if a = 1, b = 1, c = –2
   c) Force if a = 0, b = –1, c = –2 d) Pressure if a = 1, b = –1, c = –2
9. The dimension of $\frac{1}{2}\varepsilon_0E^2$, where ε_0 is permittivity of free space and E is electric field, is –
   a) ML^2T^{-2} b) $ML^{-1}T^{-2}$ c) ML^2T^{-1} d) MLT^{-1}

10. The dimensions of $(\mu_0\varepsilon_0)^{-1/2}$ are –
a) $[L^{-1/2}T^{1/2}]$ b) $[L^{1/2}T^{-1/2}]$ c) $[L^{-1}T]$ d) $[LT^{-1}]$
11. The density of material in CGS system of units is $4g/cm^3$. In a system of units in which unit of lengths is 10 cm and unit of mass is 100 g, the value of density material will be :
a) 0.4 b) 40 c) 400 d) 0.04
12. The damping force on an oscillator is directly proportional to the velocity. The units of the const. of proportionality are
a) $kgms^{-1}$ b) $kgms^{-2}$ c) kgs^{-1} d) kgs
13. In an experiment four quantities a, b, c and d are measured with percentage error 1%, 2%, 3% and 4% respectively. Quantity P is calculated as follows $P = a^3b^2/cd$. % error in P is -
a) 4% b) 14% c) 10% d) 7%
14. if force (F), velocity (V) and time (T) are taken as fundamental units, then the dimensions of mass are
a) $[FVT^{-1}]$ b) $[FVT^{-2}]$ c) $[FV^{-1}T^{-1}]$ d) $[FV^{-1}T]$
15. If energy (E), velocity (V) and time (T) are chosen as the fundamental quantities the dimensional formula of surface tension will be :
a) $[EV^{-1}T^{-2}]$ b) $[EV^{-2}T^{-2}]$ c) $[E^{-2}V^{-1}T^{-3}]$
d0 $[EV^{-2}T^{-1}]$
16. In dimension of critical velocity v_e, of liquid following through a tube are expressed as $(\eta^x\rho^y r^z)$, where η, ρ and r are the coefficient of viscosity of liquid, density of liquid and radius of the tube respectively, then the values of x, y and z are given by :
a) 1, 1, 1 b) 1, –1, –1 c) –1, –1, 1 d) –1, –1, –1
17. Planck's constant (h), speed of light in vacuum (c) and Newton's gravitational constant (G) are three fundamental constants. Which of the following combinations of these has the dimensions of length?
a) $\frac{\sqrt{hG}}{c^{3/2}}$ b) $\frac{\sqrt{hG}}{c^{5/2}}$ c) $\sqrt{\frac{hc}{G}}$ d) $\sqrt{\frac{Gc}{h^{3/2}}}$
18. E, m, L, G denote energy, mass, angular momentum and gravitation constant respectively. The dimensions of $\frac{EL^2}{m^5G^2}$ will be that of :
a) angle b) length c) mass d) time
19. The dimensional formula for which of the following pair is not the same?
a) impulse and momentum b) torque and work
c) stress and pressure d) momentum and angular momentum

20. If the speed of light (c), acceleration due to gravity (g) and pressure (p) are taken as fundamental units, the dimensions of gravitational constant (G) are :
a) $[c^2g^3p^2]$ b) $[c^0g^2p^{-1}]$ c) $[c^2g^2p^{-2}]$ d) $[c^0gp^{-3}]$

21. Which of the following combinations of three dimensionally different physical quantities P, Q, R can never be a meaningful quantity?
a) PQ – R b) PR/Q c) (P – Q)/R d) $(PR - Q^2)$ / QR

22. In a view unit system, 1 unit of time is equal to 10 second, 1 unit of mass is 5 kg and 1 unit of length is 20 m. In the new system of units, 1 unit of energy is equal to :
a) 20 joule b) $\frac{1}{20}$ joule c) 4 joule d) 16 joule

23. The dimensions of $\frac{a}{b}$ in the equation, P = where P is pressure, x is distance and t is time, are :
a) $[M^2LT^{-3}]$ b) $[MT^{-2}]$ c) $[LT^{-3}]$ d) $[ML^3T^{-1}]$

24. The time dependence of a physical quantity p is given by $p - p_0 e^{(-\alpha t^2)}$ 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

25. If area (A), velocity (υ) and density (ρ) are base units, then the dimensional formula of force can be represented as :
a) $[A\upsilon\rho]$ b) $[A\upsilon^2\rho]$ c) $[A\upsilon\rho^2]$ d) $[A^2\upsilon\rho]$

26. Two forces P and Q act at a point and have resultant R. If Q is replaced by $\frac{(R^2 - P^2)}{Q}$ acting in the direction opposite to that of Q, the resultant :
a) remains same b) becomes halfc) becomes twice d) none of these

27. If instead of mass, length and time as fundamental quantities, we choose velocity, acceleration and force as fundamental quantities express their dimensions by υ, a and F respectively, then the dimensions of Young's modulus will be expressed as :
a) $[Fa^2\upsilon^{-4}]$ b) $[F^2\upsilon^{-1}a]$ c) $[Fa^2\upsilon^{-1}]$ d) $[Fa\upsilon^{-2}]$

28. Which of the following statements is correct about conversion of units, for example 1 m = 100 cm?
a) Conversion of units have identical dimensions on each side of the equal sign but not the same units.
b) Conversion of units have identical dimensions on each side of the equal sign but not the same units.

c) If a larger unit is used then numerical value of physical quantity is large.
d) Due to conversion of units physical quantity to be measured will change.

29. If the speed υ of a particle of mass m as function of time t is given by $\upsilon = \omega A \sin\left[\left(\sqrt{\frac{k}{m}}\right)t\right]$. Where A has dimension of length.
a) The argument of trigonometric function must be a dimensionless quantity
b) Dimensional formula of ω is $[LT^{-1}]$
c) Dimensional formula of k is $[MLT^{-2}]$
d) Dimensional formula of $\sqrt{\frac{k}{m}}$ is [T]

30. If P and Q have different non-zero dimensions, which of the following operations is possible?
a) P + Q b) PQ c) P – Q d) 1 – P/Q

31. In the formula $X = 3YZ^2$, X and Z have dimensions of capacitance and magnetic induction respectively. What are the dimensions of Y in MKS system?
a) $[M^{-3}L^{-1}T^3Q^4]$ b) $[M^{-3}L^{-2}T^4Q^4]$ c) $[M^{-2}L^{-2}T^4Q^4]$ d) $[M^{-3}L^{-2}T^4Q^1]$

32. Pressure depends on distance as, $P = \frac{\alpha}{\beta}\exp\left(\frac{-\alpha z}{k\theta}\right)$, where α, β are constants, z is distance, k is Boltzmann's constant and θ is temperature. The dimensions of β are :
a) $[M^0L^0T^0]$ b) $[M^{-1}L^{-1}T^{-1}]$ c) $[M^0L^2T^0]$ d) $[M^{-1}L^{-1}T^2]$

33. A wire of length $l = 6 \pm 0.06$ cm and radius $r = 0.5 \pm 0.005$ cm and mass $m = 0.3 \pm 0.003$ g. Maximum percentage error in density is :
a) 4% b) 2% c) 1% d) 6.8%

34. Which of the following sets have different dimensions?
a) Pressure, Young's modulus, stress
b) Emf, potential difference, electric potential
c) Heat, work done, energy
d) Dipole moment, electric flux, electric field

35. Which of the pair have same dimensions?
a) Force and strain b) Force and stress
c) Angular velocity and frequency d) Energy and strain

36. 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 $(\mu_0\varepsilon_0)^{-1/2}$

37. The dimension of coefficient of viscosity is :
a) $[ML^{-1}T^{-1}]$ b) $[MLT^{-2}]$ c) $[ML^0T^{-2}]$ d) $[MLT^{-1}]$

38. A particle is moving eastwards with a velocity of 5 m/s. In 10 sec, the velocity changes to 5 m/s northwards. The average acceleration in this time is :

a) zero b) $\frac{1}{\sqrt{2}}$ ms^{-2} towards north-west

c) $\frac{1}{\sqrt{2}}$ ms^{-2} towards north-east d) $\frac{1}{2}$ ms^{-2} towards north-west

39. Out of the following the only pair that does not have identical dimensions is :

a) angular momentum and Planck's constant
b) momentum of inertia and moment of a force
c) work and torque
d) impulse and momentum

40. Which of the following units denotes the dimensions ML^2/Q^2, where Q denotes the electric charge?

a) weber (Wb) b) Wb/m^2 c) henry (H) d) H/m^2

41. The dimension of magnetic field in M, L, T and C (Coulomb) is given as :

a) $[MLT^{-1}C^{-1}]$ b) $[MT^2C^{-2}]$ c) $[MT^{-1}C^{-1}]$
d) $[MT^{-2}C^{-1}]$

42. Which of the following dimensions are correctly matched? (θ = temperature)

a) Angular momentum-$[M^1L^2T^{-1}]$ b) Torque-$[M^1L^2T^{-2}]$
c) Stefan's constant-$[M^1T^{-3}\theta^{-4}]$ d) Planck's constant $[M^1L^2T^{-2}]$

43. The gas equation for n moles of a real gas is $\left(P + \frac{a}{V^2}\right)(V - b) = nRT$ where P is the pressure, V is the volume, T is the absolute temperature, R is the molar gas, constant and a, b are arbitrary constants. Which of the following have the same dimensions as those of PV?

a) nRT b) a/V c) Pb d) ab / V^2

44. The dimensions of the quantities in one (or more) of the following pairs are the same. Identify the pair(s) :

a) Torque and work b) Angular momentum and work
c) Energy and Young's modulus d) Light-year and wavelength

45. The dimensions of length are expressed as $G^xc^yh^z$, where G, c and h are the universal gravitational constant, speed of light and Planck's constant respectively, then :

a) x = (1/2), y = (1/2) b) x = (1/2), z = (1/2)
c) y = (–3/2), z = (1/2) d) y = (1/2), z = (3/2)

46. The pairs of physical quantities that have the same dimensions in (are) :
    a) Reynolds number and coefficient of friction
    b) Curie and frequency of a light wave
    c) Latent heat and gravitational potential
    d) Planck's constant and torque