S.No.	Question Details			
	MCQ			
1.	The ratio of the dimensions of Planck constant and that of moment of inertia has the dimensions of			
	A	angular momentum.	B	time.
	C	velocity.	D	frequency.
2.	Choose the incorrect statement:			
	A	A dimensionally correct equation may be correct.	B	A dimensionally correct equation may be incorrect.
	C	A dimensionally incorrect equation must be incorrect.	D	A dimensionally incorrect equation maybe correct.
3.	If the velocity of surface wave (v) depends upon surface tension (T), coefficient of viscosity (η) and density (ρ), then the expression for v will be			
	A	$\frac{T^2}{\rho\eta}$	B	$\frac{T}{\eta}$
	C	$\frac{\eta\rho}{T^2}$	D	$\frac{\rho}{\eta}$
4.	The dimensions of capacitance in M, L, T and C (Coulomb) is given as			
	A	$[M^1L^2T^{-2}C^{-2}]$	B	$[L^{-2}T^2C^2]$
	C	$[M^{-1}L^{-2}T^2C^2]$	D	$[M^1L^{-2}T^2C^2]$
5.	If E = energy, G = gravitational constant, I = impulse and M = mass, the dimension $\frac{GI^2M}{E^2}$ is same as that of			
	A	spring constant	B	wavelength
	C	energy gradient	D	Rydberg constant
6.	The radius of a ball is (6.2 $\pm$ 0.4) cm. The percentage error in the volume of the ball is			
	A	11%	B	4%
	C	19%	D	6%
7.	The number of particles crossing the unit area perpendicular to the z-axis per unit time is given by $N = -D\left(\frac{n_2 - n_1}{z_2 - z_1}\right)$ where n1 and n2 are the numbers of particles per unit volume at z1 and z2 respectively along z-axis. What is the dimensional formula for the diffusion constant D?			

	A	$[M^0L^1T^2]$	B	$[M^0L^1T^{-3}]$
	C	$[M^0L^2T^4]$	D	$[M^0L^2T^{-1}]$
8.	The readings of a constant potential difference are noted four times by a student. The student averages these readings but does not take into account the zero error of the voltmeter. The average measurement of the potential difference is Reading 1: 1.176 V Reading 2: 1.178 V Reading 3: 1.177 V Reading 4: 1.176 V			
	A	precise and accurate.	B	precise but not accurate.
	C	accurate but not precise.	D	not accurate and not precise.
9.	One femtometer is equivalent to			
	A	10^{15} m	B	10^{-15} m
	C	10^{12} m	D	10^{-12} m
10.	Two quantities A and B are related by the relation A /B = m, where m is linear mass density and A is force. The dimensions of B will be same as that of			
	A	latent heat	B	pressure
	C	work	D	momentum
11.	The potential energy U of a particle varies with distance x from a fixed origin as $U = \frac{A\sqrt{x}}{x^2+B}$ where A and B are dimensional constants. The dimensional formula for AB is			
	A	$[M^1L^{7/2}T^{-2}]$	B	$[M^1L^{11/2}T^{-2}]$
	C	$[M^1L^{5/2}T^{-2}]$	D	$[M^1L^{9/2}T^{-2}]$
12.	In the measurement of a physical quantity $X = \frac{A^2B}{C^{1/3}D^3}$ The percentage errors introduced in the measurements of the quantities A, B, C and D are 1%, 3%, 4% and 5% respectively. Then the minimum amount of percentage of error in the measurement of X is contributed by			
	A	A	B	B
	C	C	D	D
13.	The respective number of significant figures for the numbers 23.023, 0.0003 and 2.1×10^{-3} are			
	A	4,4,2	B	5,1,2

	C	5,4,3	D	4,5,2
14.	Which of the following is not the unit of energy?			
	A	watt-hour	B	electron volt
	C	N m	D	kg m^2 s^{-2}
15.	Which of the following set have different dimensions?			
	A	Pressure, Young's modulus, stress	B	e.m.f, potential difference, electric potential
	C	Heat, work done, energy	D	dipole moment, electric flux, electric field
16	Assertion: Dimensional constants are the quantities whose values are constant. Reason: Dimensional constants are dimensionless.			
	(a) Assertion is correct, reason is correct; reason is a correct explanation for assertion		(b) Assertion is correct, reason is correct; reason is not a correct explanation for assertion	
	c) Assertion is correct, reason is incorrect		(d) Assertion is incorrect, reason is correct	
17	Assertion: When we change the unit of measurement of a quantity, its numerical value changes. Reason: Smaller the unit of measurement smaller is its numerical value			
	(a) Assertion is correct, reason is correct; reason is a correct explanation for assertion		(b) Assertion is correct, reason is correct; reason is not a correct explanation for assertion	
	c) Assertion is correct, reason is incorrect		(d) Assertion is incorrect, reason is correct	
18	Assertion: Parallax method cannot be used for measuring distances of stars more than 100 light years away. Reason: Because parallax angle reduces so much that it cannot be measured accurately.			
	(a) Assertion is correct, reason is correct; reason is a correct explanation for assertion		(b) Assertion is correct, reason is correct; reason is not a correct explanation for assertion	
	c) Assertion is correct, reason is incorrect		(d) Assertion is incorrect, reason is correct	
19	Assertion: A.U. is much bigger than Å. Reason: A.U. stands for astronomical unit and A stands for Angstrom.			

	(a) Assertion is correct, reason is correct; reason is a correct explanation for assertion	(b) Assertion is correct, reason is correct; reason is not a correct explanation for assertion
	c) Assertion is correct, reason is incorrect	(d) Assertion is incorrect, reason is correct
20	Assertion: Absolute error may be negative or positive. Reason: Absolute error is the difference between the real value and the measured value of a physical quantity.	
	(a) Assertion is correct, reason is correct; reason is a correct explanation for assertion	(b) Assertion is correct, reason is correct; reason is not a correct explanation for assertion
21	Write the dimensional formula for the following a) impulse b) Rydberg constant	
22	Can there be a physical quantity which has no units and no dimensions.	
23	What is the value of **$(5.0 \times 10^{-6}) \times (5.0 \times 10^{-8})$** with due regard to significant figures	
24	Magnitude of force experienced by an object moving with speed **v** is given by **$F = kv^2$.** Find dimensions of **k**.	
25	Write the number of significant figures of the following measuring quantities (**i) 400 m (ii) 0.008 Kg**	
26	Mention any two limitations of dimensional analysis.	
27	Name three physical quantities which have same dimensions.	
28	Give three examples of dimensionless variables?	
29	Round off to three significant digits **(i) 0.03927 Kg (ii) 4.085×10^8s (iii) 15.75**	
30	The equation of state of some gases can be expressed as **$(P + a/V^2)(V-b)$** = constant, where P is pressure, V the volume. Find the dimension of a and b.	
31	If force, mass and length are taken as fundamental units, then how do you calculate the dimension of velocity?	
32	The value of universal gravitational constant $G=6.67*10^{-11}$ N m^2Kg^{-2}. Express the value of G in units of g^{-1} cm^3s^{-2}.	
33	Youngs modulus of steel is 19×10^{10} N/m^2. Express it in $dyne/cm^2$. Here dyne is the C.G.S unit of force.	
34	Check the correctness of the relation, **$Sn = u + a/2(2n-1)$** where 'u' is the initial velocity, 'a' is the acceleration and 'Sn' is the distance travelled by the body in the nth second.	
35	Convert one atmospheric pressure ($=10^5$N m^{-2}) into dyne cm^{-2}.	
36	The force F is given in terms of time t and displacement x by the equation: **F= A cos Bx + C sin Dt** what is the dimensions of **D/B?**	

37	Using dimensional analysis, convert **60 Watt** into a system in which **100g**, **20cm** and **1min** are the fundamental units of mass, length and time respectively.
38	Given that the time period T of oscillation of a gas bubble from an explosion under water depends upon P, D and E where P is the static pressure, D the density of water and E is the total energy of explosion, find dimensionally a relation for T.
39	The escape velocity from the surface of earth is given by $v = \sqrt{}(2GM / R)$, where M is mass and R is radius of earth . Check the correctness of the formula.
40	The frequency of vibration f of a mass m at the end of a spring is given by $F=K^b m^a$ where K is spring constant. Use dimensional analysis to find a and b. It is known that $[f] = [T^{-1}]$ and $K = [MT^{-2}]$.
41	Force F and density d are related as $F = \frac{A}{B+\sqrt{d}}$ .Obtain the dimensions of A and B.
42	Write the dimension of a/b in the relation $F=a\sqrt{}\ x + bt^2$ where F is force x is distance and t is time
43	Find the value of force of 100N on system based upon the metre, the kilogram and the minute as fundamental units.
44	A jet of water of cross-sectional area A and velocity impinges normally on a stationary flat plate. The mass per unit volume of water is ρ. By dimensional analysis, determine an expression for the force F exerted by the jet against the place.
45	Experiment shows that frequency (n) of a tuning fork depends on length (l) of the prong, density (d) and the Youngs modulus(Y) of its material. On the basis of dimensional analysis, derive an expression for the frequency of tuning fork.
46	The coefficient of viscosity 'η' of a liquid having a dimensional formula $[ML^{-1}T^{-1}]$ depend on the terminal velocity 'v' of a small ball of radius **' r'** and mass ' m'. It is also directly proportional to the acceleration due to **'g'** gravity. Obtain an expression for 'η' in terms of **v**, **r ,m** and **g**. Take k is the constant of proportionality.
47	The velocity (v) of transverse waves on a string may depend upon (i) length) (ii) of string, (ii) tension T in the string and (iii) mass per unit length (m) of the string. Derive the formula dimensionally.
48	The frequency (v)of an oscillating drop may depend upon radius(r) of the drop, density(ρ) of liquid and the surface tension(S) of the liquid. Deduce the formula dimensionally.
49	The centripetal force (F) acting on a particle moving uniformly in a circle depends upon its mass (m), velocity (v) and radius of circle (r). Derive the expression for centripetal force using method of dimensions.
50	Two roads have length measured as (1.8 ± 0.2)m and (2.3±0.1)m. Calculate their combined length with error limits.[Ans:4.1± 0.3 ohm]
51	The sides of a rectangles are (5.181±0.3) m and (17.81±0.6)m .Find their sum with error limits[Ans:(22.99±0.9)m]
52	The resistance R is the ratio of potential difference V and current I. What is the % error in R if **V= (100±5) volt and I =(10 ±0.2)** Ampere.
53	*Given* that the *amplitude of the scattered light* is (i) *directly proportional* to that of incident *light*, (ii) *directly proportional* to the volume of the *scattering* dust particle (iii) inversely proportional to

	its distance from the scattering particle, and (iv)dependent upon the wavelength (λ) of the *light*. Show that the intensity of *scattered light* varies as **$1/(\lambda^4)$.**
54	The force acting on an object of mass m, travelling at velocity v in a circle of radius r is given by: $F = \frac{mv^2}{r}$ .Measurements are recorded as **m** = (3.5± 0.105) kg, **v**= (20 ± 1) $ms^{-1;}$ **r**= (12.5 ± 0.5) m. Find the maximum possible i) fractional error ii) percentage error in the measurement of force. How will you record the reading?
55	Assuming that the mass m of the largest stone that can be moved by a flowing water depends upon the velocity *v* of water, its density ρ and acceleration due to gravity g, show that m varies as the sixth power of the velocity of water in the river.
56	The period of oscillation of a sample pendulum is $T= 2\pi\sqrt{\ }$ (L/g) .Measured the value of L is 20.0cm known to 1mm accuracy and time for 100 oscillation of the pendulum is found to be 90s using a wristwatch of one resolution. What is the accuracy in the determination of g? [Ans: ±3%].
57	We measure the period of oscillation of a simple pendulum. In successive measurements, the readings turn out to be 2.63s, 2.56s, 2.42s, 2.71s and 2.80s. Calculate the absolute errors, relative error and percentage error.
58	**CASE STUDY 1** Read the following paragraph and answer the following questions: System of units: A system of units is a collection of units in which certain units are chosen as fundamental and all others are derived from them. This system is also called an absolute system of units. Some common systems in use are: · c.g.s system: The unit of length is centimeter, mass is gram, time is second. · m.k.s system: The unit of length is meter, mass is kilogram, time is second. · f.p.s system: The unit of length is foot, mass is pound, time is second. · S.I. system: In 1960, 11th General Conference of Weights and Measures introduced SI system. It has 7 fundamental units (Unit of length is meter, mass is kilogram, Time is second, Temperature is Kelvin, Electric current is Ampere, Luminous intensity is Candela, Amount of substance is mol) and two supplementary units (Unit of plane angle is radian, solid angle is steradian) (i)The weight of a body is 12g. This statement is not correct because (a) The correct symbol for the unit of weight has not been used. (b) The correct symbol for gram is gm. (c) The weight should be expressed in kg. (d) Of some reason other than those given above. (ii) If the unit of force and length are doubled, the unit of energy will be (a) 1/2 times (b) 2 times (c) 4 times (d) 1/4 times (iii)The density of a liquid is 13.6 g cm-3. Find its value is S.I system OR (iii) Taking velocity and force as fundamental quantities, find the dimensions of mass

59	**CASE STUDY 2** Read the following paragraph and answer the questions. Significant figures in the measured value of a physical quantity tell the number of digits in which we have confidence. Larger the number of significant figures obtained in a measurement, greater is the accuracy of measurement and vice – versa. In addition or subtraction, the number of decimal places in the result should equal the smallest number of decimal places in any term in the operation. In multiplication and division, the number of significant figures in the product or in the quotient is the same as the smallest number of significant figures in any of the factors. With the help of above comprehension, choose the most appropriate alternative for each of the following questions: (i) Subtract 2.6×10^4 from 3.9×10^5 with due regard to significant figures. (a) 3.64×10^5 (b) 3.7×10^5 (c) 3.6×10^5 (d) 3.65×10^6 (ii) If a calculated value 2.7465 g contains only three significant figures, the two insignificant digits in it are (a) 2 and 7 (b) 7 and 4 (c) 6 and 5 (d) 4 and 6 ,4 (iii) The mass and volume of a body are 4.237 g and 2.5 cm3, respectively. Find the density of the material of the body in correct significant figures. OR (iii) Write any two rules for significant figure calculation.