

CH 2 – UNITS & MEASUREMENTS

PRACTICE SHEET - 1

No.	Questions	Answers
1	State the number of significant figures in the following : a) 453.5 b) 53,000,000 c) 400.08 d) 0.000243 e) 0.0650 f) 2.43×10^5	4, 2, 5, 3, 3
2	Round off the following numbers as indicated. a) 18.35 up to 3 digits b) 142.45 up to 4 digits c) 248337 up to 3 digits d) 321.325×10^{-5} upto 4 digits.	18.4, 142.4, 248000, 321.3×10^{-5}
3	Check the correctness of the equation : $Fd = \frac{1}{2} mv^2 - \frac{1}{2} mu^2$, where F is the force acting on a body of mass m and d is the distance moved by the body when its velocity changes from u to v.	-
4	The Vander-Wall's equation for a gas is $(P + \frac{a}{V^2})(V - b) = RT$, where P the pressure, V the volume, T the temperature. Find the dimensions and SI units of a and b.	[a] = $[ML^5T^{-2}]$ [b] = $[L^3]$
5	When light travels through glass, the refractive index of glass is found to vary with wavelength as $\mu = A + \frac{B}{\lambda^2}$. Using the principle of homogeneity of dimensions, find the dimensions and SI units of the constants A and B.	[A] = $[M^0L^0T^0]$ [B] = $[L^2]$ Units : No unit, m^2
6	In the equation $y = a \sin(\omega t - kx)$, t and x stands for time and distance respectively and y stands for displacement. Obtain the dimensional formula for ω and k, if 'a' represents the amplitude.	$[\omega] = [T^{-1}]$ $[k] = [L^{-1}]$
7	The velocity v of water waves depends on the wavelength λ , density of water ρ and acceleration due to gravity g. Deduce the relation for v by using dimensional analysis.	$v = k\sqrt{\lambda g}$
8	Assuming that the mass (M) of the largest stone that can be moved by the flowing water depends upon the velocity (v), density of water (ρ), and on acceleration due to gravity (g), show that M varies with the sixth power of velocity.	* Show that $M \propto v^6$
9	Subtract 4.27153 from 6.807 and express the result to an appropriate number of significant figures.	2.535
10	The length of a rod as measured in an experiment was found to be 2.48m, 2.49m, 2.50m, 2.46m and 2.48m. Find the length, the mean absolute error and the percentage error.	$(2.48 \pm 0.01 \text{ m},$ $0.4\%)$
11	Two different masses are determined as $(23.7 \pm 0.5)\text{g}$ and $(17.6 \pm 0.3)\text{g}$. What is the sum of their masses ?	$(41.3 \pm 0.8)\text{g}$
12	If the error involved in the measurements of a side and mass of a cube are 3% and 4% respectively , what is the maximum permissible error in the density of the material ?	(13%)
13	The percentage error involved in the measurement of mass and speed are 2% and 3% respectively. How much will be the maximum error in calculating the kinetic energy of the body ?	(8%)
14	The diameter of a sphere is 2.78m. Calculate its volume and express the same with proper significant figures.	(11.2 m^3)

14	Each side of a cube is measured to be 7.0203m. What is the a) total surface area b) volume of the cube to appropriate significant figures ?	(311.3 m ³ , 373.7 m ³)
15	The voltage across a lamp is (6.0±0.1) V and the current passing through it is (4.0±0.2) A. Find the power consumed by the lamp.	(24 ± 2) W
16	A body travels uniformly a distance of (13.8 ± 0.2) m in a time (4.0 ± 0.3) s. Calculate its velocity with error limits. What is the percentage error in the velocity ?	(3.4 ± 0.3)m/s, 9%
17	A physical quantity X is related to three observables a, b and C as $X = \frac{\sqrt{a} b^2}{c^2}$. The errors of measurement in a, b and c are 2%, 1% and 3% respectively. What is the percentage error in X?	(9%)
18	The internal and external diameter of a hollow cylinder are measured with the help of a vernier calipers. Their values are (3.87 ± 0.01) cm and (4.23 ± 0.01) cm respectively. The thickness of the wall of the cylinder is : a) 0.36 ± 0.02 cm b) 0.18 ± 0.02 cm c) 0.36 ± 0.01 cm d) 0.18 ± 0.01	0.36 ± 0.02 cm
19	The least count of a stop watch is 0.2s. The time of 20 oscillations of a pendulum is measured to be 25s. The percentage error in the measurement of time will be: a) 8% b) 1.8% c) 0.8% d) 0.1%	0.8%
20	The potential difference across a conductor is V = (8 ± 0.5)V and current through the resistance is (2 ± 0.2) A. What is the resistance of the conductor? a) 4 Ω ± 16.25 % b) 4 Ω ± 6.25 % c) 4 Ω ± 10 % d) 4 Ω ± 8 %	4 Ω ± 16.25 %
21	Write the order of magnitude of the following : a)8 b) 49 c) 52 d) 999 e)1001 f) 753000 g) 0.05 h) 0.99	1, 1, 2, 3, 3, 6, -2, 0
22	Find the odd one out: a) Energy density b) Force / Area c) (Charge/volume) X voltage d) angular momentum/mass	d
23	If E,M,J and G denote energy, mass, angular momentum and gravitational constant respectively, then $\frac{EJ^2}{M^5G^2}$ has the dimensions of	Angle
24	A gas bubble formed from an explosion under water oscillates with a period proportional to P ^a d ^b E ^c , where P is the static pressure, d is the density of water and E is the energy of explosion. Find the values of a, b and c.	$-\frac{5}{6}, \frac{1}{2}, \frac{1}{3}$
25	The specific resistance ρ of a circular wire of radius r , resistance R and length l is given by, $\rho = \frac{\pi r^2 R}{l}$ If $r = 0.24 \pm 0.02$ cm , $R = 30 \pm 1$ Ω, $l = 4.80 \pm 0.01$ cm, find the percentage error in ρ	20% (approx)