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CLASS XI<br>PHYSICAL WORLD AND MEASUREMENT

## SECTION -A CONCEPTUAL \& APPLICATION TYPE QUESTIONS

1 State the various forces in nature. Give the relative strength of various forces in nature.
2 State the Laws of Conservation in Physics .
3 Define light year and astronomical unit . Arrange in the descending order : light year, astronomical unit and parsec .

4 Differentiate between accuracy and precision.
5 Which of the following length measurement is most precise and why ? (i) 4.0 cm (ii) 4.00 cm (iii) 4.000 cm .

6 Which of the following is the most precise device for measuring length and why:
(a) a verniercallipers with 20 divisions on the sliding scale
(b) a screw guage of pitch 1 mm and 100 divisions on the circular scale
(c) an optical instrument that can measure length to within a wavelength of light.

7 How many light years are in one metre? $\quad 1$
$8 \quad$ Name the device used for measuring the mass of atoms and molecules. 1
9 Which is the most accurate clock ?
10 Distinguish between inertial mass, gravitational mass and weight of a body.
11 What do you mean by fundamental and derived quantities?
12 Give the derived units of (i) linear momentum (ii) power $\quad$ (iii)stress $\quad$ (iv) surface tension 3 (v) torque (vi) impulse

13 Name any three physical quantities having the same dimensions. Also write the dimension.
14 (i)Can there be a physical quantity which has no units and no dimensions . Give examples .
(ii) Can a quantity have dimensions but still have no units ?
(iii) Can a quantity have units but still be dimensionless? Give examples .

15 The dimensional analysis fails to derive the relation involving more than three independent factors . 1 Comment

16 How can random error be minimized ?
17 Distinguish between the dimensions and unit of a physical quantity.

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18 Which quantity in a given formula should be measured most accurately ?
19 State the advantages of SI over other systems of units.
20 Mention the limitations of the method of dimensional analysis.

## SECTION - B NUMERICAL QUESTIONS

1 A LASER beam aimed at the moon takes 3.26 seconds to return after reflection at moon's surface.
Find the radius of lunar orbit around earth.
2 The parallax of a heavenly body measured from two points diametrically opposite on equator of earth is $4^{\prime}$. If the radius of earth is 6400 km , find the distance of heavenly body from the centre of the earth in AU

3 The Sun's angular diameter is measured to be 1920". Thedistance of the Sun from the Earth is $1.496 \times 10^{11} \mathrm{~m}$. What is the diameter of the Sun ?

4 The length breadth and thickness of a metal sheet are $4.234 \mathrm{~m}, 1.005 \mathrm{~m}$ and 2.01 cm respectively. . Find the area and volume of the sheet to correct number of significant figures .

5 Write the number of significant figures in the following :
(i) $0.007 \mathrm{~m}^{2}$ (ii) $2.64 \times 10^{24} \mathrm{~kg}$


A physical quantity P is given $\mathrm{P}=\frac{a^{3} b^{2}}{\sqrt{c} d}$. The percentage errors in $\mathrm{a}, \mathrm{b}, \mathrm{c}$ and d are $1 \%, 3 \%$ ,4\% and 3\% respectively .Find the percentage error in P .

The period of oscillation of a simple pendulum is $\mathrm{T}=2 \pi \sqrt{\frac{L}{g}}$ where $\mathrm{L}=10 \mathrm{~cm}$ and is known tol mm accuracy .The period of one oscillation is measured is about 0.5 s . The time of 100 oscillation is measured with a wrist watch of 1 s resolution. What is the accuracy in the determination of g ?

8 Add $17.35 \mathrm{~g}, 22.6 \mathrm{~g}$ and 8.498 g and write the result with the correct number of significant figures

The rate of flow V of liquid flowing through a pipe of radius r and a pressure gradient $\frac{P}{l}$ is given by the equation $: \mathrm{V}=\frac{\pi P r^{4}}{8 \eta l}$. Check the dimensional consistency of this equation where $\eta$ is the coefficient of viscosity .

Find the value of x in the relation $\mathrm{Y}=\frac{T^{x} \cos \theta \tau}{L^{3}}$, where Y is Young's modulus, T is time period, $\tau$ is torque and L is length.

11 Aplanet moves around the sun in nearly circular orbit . Its period of revolution T depends upon : (i) radius r of orbit (ii) mass M of the sun and (iii) the gravitational constant G. Show dimensionally that $\mathrm{T}^{2} \alpha \mathrm{r}^{3}$.

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12 Assuming that the mass M of the largest stone that can be moved by a flowing river depends upon the velocity v , the density of water $\rho$ and the acceleration due to gravity g . Show that M varies with the sixth power of the velocity of flow.

13 The value of G in cgs system is $6.67 \times 10^{-8}$ dyne $\mathrm{cm}^{2} \mathrm{~g}^{-2}$. Calculate the value in SI system.
14 Find the value of a force of 100 N on a system based upon the metre, the kilogram and the minute as the fundamental units.

15 The velocity of sound waves v through a medium may be assumed to depend on the density of the medium $d$ and the modulus of elasticity E. Deduce by the method of dimensions the formula for the velocity of sound .Take dimensional constant $\mathrm{K}=1$.

16 The period of vibration of a tuning fork depends on the length 1 of its prong, density d and Young's modulus Y of its material. Deduce an expression forthe period of vibration on the basis of dimensions.

17 Find the dimensions of $\frac{a}{b}$ in the equation : $\mathrm{F}=\mathrm{a} \sqrt{x}+\mathrm{bt}^{2}$, where F is force, x is distance and t is time.

18 In successive measurements ,the readings of the period of oscillation of a simple pendulum were found to be $2.63 \mathrm{~s}, 2.56 \mathrm{~s}, 2.42 \mathrm{~s}, 2.71 \mathrm{~s}$ and 2.80 s in an experiment. Calculate mean value of the period of oscillation, absolute error in each measurement, mean absolute error, relative error and percentage error .

19 Convert (i) one Newton into dyne (ii) one Joule into erg
20 Find the value of 100 J in a system that has $10 \mathrm{~g}, 100 \mathrm{~cm}$ and 50 s as units

