CLASS XI
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

2   State the Laws of Conservation in Physics .   2

3   Define light year and astronomical unit . Arrange in the descending order : light year ,   2
     astronomical unit and parsec .

4   Differentiate between accuracy and precision.   2

5   Which of the following length measurement is most precise and why ?   (i) 4 .0 cm   (ii) 4.00 cm   2
     (iii) 4.000 cm.

6   Which of the following is the most precise device for measuring length and why: 2

      (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 ?   1

8   Name the device used for measuring the mass of atoms and molecules.   1

9   Which is the most accurate clock ?   1

10   Distinguish between inertial mass , gravitational mass and weight of a body.   2

11   What do you mean by fundamental and derived quantities ?   2

12   Give the derived units of (i) linear momentum   (ii) power   (iii)stress   (iv) surface tension   3
      (v) torque   (vi) impulse

13   Name any three physical quantities having the same dimensions . Also write the dimension.   2

14   (i)Can there be a physical quantity which has no units and no dimensions . Give examples .   3

      (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 ?   1

17   Distinguish between the dimensions and unit of a physical quantity.   1

18 Which quantity in a given formula should be measured most accurately ?   1

19 State the advantages of SI over other systems of units.   2

20 Mention the limitations of the method of dimensional analysis.   2

SECTION – B   NUMERICAL QUESTIONS

1   A LASER beam aimed at the moon takes 3.26 seconds to return after reflection at moon's surface.   2
    Find the radius of lunar orbit around earth.

2   The parallax of a heavenly body measured from two points diametrically opposite on equator of   2
    earth is 4′. 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   2
    1.496 x 10 ^{11}m . What is the diameter of the Sun ?

4   The length breadth and thickness of a metal sheet are 4.234 m , 1.005 m and 2.01 cm   2
    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 m^2 (ii) 2.64 x 10 ^{24} kg   3
    (iii)0.2370 g cm^{-3} (iv) 6.206 J   (v) 7.032 Nm^{-2}(vi) 0.0005062 m^2

6   2
    A physical quantity P is given $P = \dfrac{a^3 b^2}{\sqrt{c}d}$. The percentage errors   in a , b , c and d are 1% ,3%
    ,4% and 3% respectively .Find the percentage error in P .

7   3
    The period of oscillation of a simple pendulum is $T = 2\pi \sqrt{\dfrac{L}{g}}$ where   L = 10cm and is known

    to1mm accuracy .The period of one oscillation is measured is   about 0.5 s   . The time
    of100oscillation is measured with a wrist watch of 1 s resolution . What is the accuracy in the
    determination of g ?

8   Add 17.35 g , 22.6 g and 8.498 g and write the result with the correct number of significant   2
    figures

9   2
    The rate of flow V of liquid flowing through a pipe of radius r and a pressure gradient$\dfrac{P}{l}$ is given

    by the equation :$V = \dfrac{\pi P r^4}{8\eta l}$. Check the dimensional consistency of this equation where η is the

    coefficient of viscosity .

10   2
    Find the value of x in the relation $Y = \dfrac{T^x \cos \theta\ \tau}{L^3}$, where Y is Young's modulus , T is time

    period , τ is torque and L is length.

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

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 ρ and the acceleration due to gravity g. Show that M varies with the sixth power of the velocity of flow.   3

13 The value of G in cgs system is 6.67 x 10^{-8} dyne $cm^2 g^{-2}$. Calculate the value in SI system.   2

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 .   2

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 K = 1.   3

16 The period of vibration of a tuning fork depends on the length l 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.   3

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

18 In successive measurements ,the readings of the period of oscillation of a simple pendulum were found to be 2.63 s , 2.56 s , 2.42 s , 2.71 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 .   3

19 Convert (i) one Newton into dyne (ii) one Joule into erg   3

20 Find the value of 100 J in a system that has 10 g , 100 cm and 50 s as units   2