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 , astronomical unit and parsec .	2
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 (iii) 4.000 cm.	2
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.	2
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 (v) torque (vi) impulse	3
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 . (ii) Can a quantity have dimensions but still have no units ? (iii) Can a quantity have units but still be dimensionless ? Give examples .	3
15	The dimensional analysis fails to derive the relation involving more than three independent factors . Comment	1
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. Find the radius of lunar orbit around earth.	2
2	The parallax of a heavenly body measured from two points diametrically opposite on equator of 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	2
3	The Sun's angular diameter is measured to be 1920" . Thedistance of the Sun from the Earth is 1.496 x 10^{11}m . What is the diameter of the Sun ?	2
4	The length breadth and thickness of a metal sheet are 4.234 m , 1.005 m and 2.01 cm respectively. . Find the area and volume of the sheet to correct number of significant figures .	2
5	Write the number of significant figures in the following : (i) 0.007 m^2 (ii) 2.64 x 10^{24} kg (iii)0.2370 g cm^{-3} (iv) 6.206 J (v) 7.032 Nm^{-2}(vi) 0.0005062 m^2	3
6	A physical quantity P is given $P = \frac{a^3 b^2}{\sqrt{c}d}$. The percentage errors in a , b , c and d are 1% ,3% ,4% and 3% respectively .Find the percentage error in P .	2
7	The period of oscillation of a simple pendulum is $T = 2\pi\sqrt{\frac{L}{g}}$ 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 ?	3
8	Add 17.35 g , 22.6 g and 8.498 g and write the result with the correct number of significant figures	2
9	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 :$V = \frac{\pi P r^4}{8\eta l}$. Check the dimensional consistency of this equation where η is the coefficient of viscosity .	2
10	Find the value of x in the relation $Y = \frac{T^x \cos\theta\ \tau}{L^3}$, where Y is Young's modulus , T is time period , τ is torque and L is length.	2
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 $T^2 \alpha\ r^3$.	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 6.67×10^{-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 $\frac{a}{b}$ 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