INDIAN SCHOOL MUSCAT

CLASS : 11

SUBJECT : PHYSICS

WORKSHEET 1

DATE :……..

TOPIC : **PHYSICAL WORLD AND DIMENSION**

SECTION – A CONCEPTUAL AND 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 par sec.
4. Differentiate between accuracy and precision.
5. Name the device used for measuring the mass of atoms and molecules.
6. Which is the most accurate clock?
7. Distinguish between inertial mass and gravitational mass.
8. What do you mean by fundamental and derived quantities?
9. Give the derived units of (i) linear momentum (ii) power (iii)stress (iv) surface tension (v) torque (vi) Force
10. Find the dimensions of the following physical quantities (i) Work (ii) Pressure (iii) Angle (iv) Universal gravitational constant (v) Impulse (vi) Relative density (vii)Linear magnification (viii)Momentum (ix)Force (x)Thrust
11. Name any three physical quantities having the same dimensions. Also write the dimension.
12. (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.
13. The dimensional analysis fails to derive the relation involving more than three independent factors. Comment
14. How can random error be minimized?
15. Distinguish between the dimensions and unit of a physical quantity.
16. Which quantity in a given formula should be measured most accurately?

17. State the advantages of SI over other systems of units.

18. Mention the limitations of the method of dimensional analysis.

SECTION – B NUMERICAL PROBLEMS

1. A LASER beam aimed at the moon takes 3.5 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 5′. If the radius of earth is 6400 km , find the distance of heavenly body from the Centre of the earth .

3. The Sun's angular diameter is measured to be 1860". The distance of the Sun from the Earth is 1.496×10^{11} m. What is the diameter of the Sun?

4. Write the number of significant figures in the following (i) 0.007 m^2 (ii) 2.64×10^{24} kg (iii)0.2370 g cm^{-3} (iv) 6.206 J (v) 7.032 Nm^{-2} (vi) 0.0005062 m^2

5. 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.

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

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

8. 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.

9. 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.

10. A planet 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 $T^2 \alpha\, r^3$.

11. 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.

12. The value of G in cgs system is 6.67 x 10^{-8} dyne cm^2 g^{-2}. Calculate the value in S I system.

13. Find the value of a force of 200 N on a system based upon the metre, the kilogram and the minute as the fundamental units.

14. 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.

15. 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 for the period of vibration on the basis of dimensions.

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

17. 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 .

18. Convert one Newton into dynes using dimensional analysis.

19. Convert one Joule into ergs using dimensional analysis.

20. Find the value of 1000 J in a system that has 10 g, 100 cm and 50 s as units.