

# Sainik School Chandrapur

## Class XI Physics

### Summer Vacation Holiday Home work 2024-25

- 1) What do you mean by measurement of a physical quantity?
- 2) If  $x = a + bt + ct^2$  where  $x$  is in metres and  $t$  in seconds, write the units of  $a$ ,  $b$ ,  $c$ .
- 3) Find the expression for centripetal force if it depends upon mass of the body, speed of the body, and the radius of the circular path.
- 4) Give any four rules that applied in determining the number of significant figures with examples.
- 5) State the rules for Rounding off the Uncertain Digits with examples
- 6) The mass of an object is measured to be 4.237g and its volume is measured to be 2.51cm<sup>3</sup>, then find the density of the substance with significant figures stating the reason for significant figures
- 7) Each side of a cube is measured to be 7.203m. What are the total surface area and the volume of the cube to appropriate significant figures?
- 8) Consider an equation  $\frac{1}{2} mv^2 = mgh$  where  $m$  is the mass of the body,  $v$  its velocity,  $g$  is the acceleration due to gravity and  $h$  is the height. Check whether this equation is dimensionally correct.
- 9) State the principle of homogeneity of dimensions in an equation. Also give any two limitations of dimensional analysis.
- 10) Consider a simple pendulum, having a bob attached to a string, which oscillates under the action of the force of gravity. Suppose that the period of oscillation of the simple pendulum depends on its length ( $l$ ), mass of the bob ( $m$ ) and acceleration due to gravity Derive the expression for its time period using the method of dimensions.
- 11) It is observed that a liquid rises in a capillary to a certain height due to Surface Tension. This height ' $h$ ' to which a liquid rises in a capillary depends upon the radius of the capillary ' $r$ ', Surface Tension of liquid ' $S$ ', density of liquid ' $\rho$ ' and acceleration due to gravity ' $g$ ' of that place. Can you establish a relation between these quantities ' $h$ ', ' $S$ ', ' $r$ ', ' $\rho$ ', ' $g$ ' using Dimensional Analysis? If not why? What limitation do you see here?
- 12) A particle of mass ' $m$ ' is tied to a string and swung around in a circular path of radius ' $r$ ' with a constant speed ' $v$ '. Derive a formula for the centripetal force ' $F$ ' exerted by the particle on our hand, using the method of dimensions.
- 13) The frequency ' $n$ ' of a tuning fork depends upon length ' $l$ ' of the prong, the density ' $\rho$ ' and young's modulus ' $Y$ ' of its material. From dimensional considerations, find a possible formula for the frequency of the tuning fork.
- 14) Find the dimension of  $a/b$  in the relation  $F = a\sqrt{x} + bt^2$ , where ' $F$ ' is force, ' $x$ ' is distance and ' $t$ ' is time.
- 15) Use Dimensional Analysis to check the correctness of the equation:  
 $S = ut + gt^2$ . Is the relation actually, correct? What limitation of Dimensional Analysis does it reveal?

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