

CLASS XI-PHYSICS
UNIT & MEASUREMENTS

ASSIGNMENT-1

NUMERICAL QUESTIONS:

- Q.1** The dimensional formula of a physical quantity x is $[M^{-1}L^3T^{-2}]$ the percentage error in measuring the quantities M , L and T are 2%, 3% and 4%. Find the maximum percentage error that occurs in measuring the quantity x .
- Q.2** Force applied by water jet from a pipe depends upon
(i) velocity of water (ii) density of water
(iii) cross-sectional area of pipe. How many times force will be increased if velocity of a water is increased 2 times ?
- Q.3** A student measures diameter of a sphere using vernier calliper having least count 0.1 mm and reports diameter equal to 0.025307 meter. Numbers of significant figure in diameter will be-
- Q.4** A quantity x is defined as $x = \frac{a^3 - b^2}{\sqrt{c+d}}$. Value of a , b , c and d are reported as $a = 3 \pm 0.001$, $b = 5 \pm 0.0013$, $c = 6 \pm 0.24$ and $d = 10 \pm 0.4$. Percentage error in x will be -
- Q.5** Lifting power of helicopter depends upon hovering speed of blades (ω), length of blades (l) and density of air (ρ). how many times lifting power will increase if hovering speed is increased two times.
- Q.6** Dimension of a base quantity in other base quantities is equal to
- Q.7** Find the missing number in the expression given below $A = s e^{\frac{at^1}{A}}$ where s : displacement, t : time , a : acceleration.
- Q.8** A physical quantity A is dependent on other four physical quantities p , q , r and s as given below $A = \frac{\sqrt{pq}}{r^2s^3}$. The percentage error of measurement in p , q , r and s are 1%, 3%, 0.5% and 0.33% respectively, then what is the maximum percentage error in A ?
- Q.9** The lengths of sides of cuboid are a , $2a$ and $3a$. If the relative percentage error in the measurement of a is 1%, then what is the relative percentage error in the measurement of volume of cube.
- Q.10** The length of a cylinder is measured with a metre rod having least count 0.1 cm. Its diameter is measured with vernier calipers having least count 0.01 cm. Given that length is 5.0 cm and radius is 2.0 cm. The percentage error in the calculated value of the volume will be -

Q.11 A 2m wide truck is moving with a speed of $5\sqrt{5}$ m/s along a straight horizontal road. A man starts crossing the road with a uniform speed v when the truck is 4m away from him. The minimum value of v (in m/s) to cross the truck safely is-

Q.12 A particle of mass m is located in a region where its potential energy $[U(x)]$ depends on the position x as Potential Energy

$$[U(x)] = \frac{a}{x^2} - \frac{b}{x} \text{ here } a \text{ \& } b \text{ are positive constants}$$

(i) Write dimensional formula of a & b

(ii) If the time period of oscillation which is calculated from above formula is stated by a student as $T =$

$$4\pi a \sqrt{\frac{ma}{b^2}}, \text{ check whether his answer is dimensionally correct.}$$

Q.13 Find the number of significant digits in 0.01050

Q.14 Dimensional formula of capacitance is written as $[M^{-1}L^{-2}T^x A^{+2}]$. Find x . $C = \frac{q^2}{2U}$ where U stands for energy and q charge.

Q.15 The area of a rectangle of size 1.25 cm \times 1.55 cm is 1.9 y , where y is single digit numbers. Find y .

Q.16 Dimensional formula of electric potential (V) is given by $[ML^2T^{-x}A^{-1}]$. Find x .

Given: $V = \frac{\text{Energy}}{\text{Charge}}$

Q.17 Dimensional formula of inductance (L) is given by $[ML^2T^{-x} A^{-2}]$. Find x .

Given : Inductance (L) = $\frac{2 \times \text{energy}}{(\text{current})^2}$