# Chapter 1 Unit and Measurements

## Assignment 1

## Class 11

## Topic :- UNITS AND MEASUREMENTS

1. In an experiment, to measure the height of a bridge by dropping stone into water underneath, if the error in measurement of time is $0.1 s$ at the end of $2s$, then the error in estimation of height of bridge will be
   a) $0.49\ m$              b) $0.98\ m$              c) $1.96\ m$              d) $2.12\ m$

2. The dimension of $k$ in the equation $W = \frac{1}{2}kx^2$ is
   a) $[ML^0T^{-2}]$         b) $[M^0LT^{-1}]$         c) $[MLT^{-2}]$          d) $[ML^0T^{-1}]$

3. A body of mass $m = 3.513$ kg is moving along the $x-$axis with a speed of $5.00\ \text{ms}^{-1}$. The magnitude of its momentum is recorded as
   a) $17.6\ \text{kg ms}^{-1}$   b) $17.565\ \text{kg ms}^{-1}$   c) $17.56\ \text{kg ms}^{-1}$   d) $17.57\ \text{kg ms}^{-1}$

4. The dimensional formula for the modulus of rigidity is
   a) $ML^2T^{-2}$          b) $ML^{-1}T^{-3}$        c) $ML^{-2}T^{-2}$       d) $ML^{-1}T^{-2}$

5. The unit of physical quantity obtained by the line intergral of electric field is
   a) $NC^{-1}$             b) $Vm^{-1}$              c) $JC^{-1}$             d) $C^2N^{-1}m^{-2}$

6. The dimensions of gravitational constant $G$ and the moment of inertia are respectively
   a) $[ML^3T^{-2}]; [ML^2T^0]$              b) $[M^{-1}L^3T^{-2}]; [ML^2T^0]$
   c) $[M^{-1}L^3T^{-2}]; [M^{-1}L^2T]$      d) $[ML^3T^{-2}]; [M^{-1}L^2T]$

7. Unit of stress is
   a) $N/m$   b)              $N-m$ c)              $N/m^2$              d) $N-m^2$

8. Crane is British unit of volume (one crane = 170.4742). convert crane into SI units.
   a) $0.170474\ m^3$       b) $17.0474 m^3$          c) $0.00170474 m^3$      d) $1704.74 m^3$

9. SI unit of intensity of wave is
   a) $Jm^{-2}s^{-1}$       b) $Jm^{-1}s^{-2}$        c) $W\ m^{-2}$           d) $J\ m^{-2}$

10. If $F$ denotes force and $t$ time, then in equation $F = at^{-1} + bt^2$, the dimensions of $a$ and $b$ respectively are

a) $[LT^{-4}]$ and $[LT^{-1}]$         b) $[LT^{-1}]$ and $[LT^{-4}]$

c) $[MLT^{-4}]$ and $[MLT^{-1}]$       d) $[MLT^{-1}]$ and $[MLT^{-4}]$

11. If the constant of gravitation $(G)$, Plank's constant $(h)$ and the velocity of light $(c)$ be chosen as fundamental units. The dimension of the radius of gyration is

a) $h^{1/2}c^{-3/2}G^{1/2}$     b) $h^{1/2}c^{3/2}G^{1/2}$     c) $h^{1/2}c^{-3/2}G^{-1/2}$     d) $h^{-1/2}c^{-3/2}G^{1/2}$

12. The mass and volume of a body are found to be $500 \pm 0.05 \, kg$ and $1.00 \pm 0.05 m^3$ respectively. Then the maximum possible percentage error in its density is

a) 6%            b) 3%            c) 10%           d) 5%

13. The unit of Stefan's constant $\sigma$ is

a) $W \, m^{-2} \, K^{-1}$      b) $W \, m^2 \, K^{-4}$      c) $W \, m^{-2} \, K^{-4}$      d) $W \, m^{-2} \, K^4$

14. In the equation $y = a \sin(\omega t + kx,)$ the dimensional formula of $\omega$ is

a) $[M^0L^0T^{-1}]$     b) $[M^0LT^{-1}]$     c) $[ML^0T^0]$     d) $[M^0L^{-1}T^0]$

15. The following observations were take for determining surface tension of water by capillary tube method. Diameter of capillary, $D = 1.25 \times 10^{-2}$ m and rise of water in capillary. $h = 1.46 \times 10^{-2}$ m

Taking g $= 9.80 ms^{-2}$ and using the relation $T = (rgh/2) \times 10^3 Nm^{-1}$, what is the possible error in surface tension $T$?

a) 2.4%         b) 15%          c) 1.6%         d) 0.15%

16. $R$ and $L$ represent respectively resistance and self inductance, which of the following combinations has the dimensions of frequency

a) $\dfrac{R}{L}$         b) $\dfrac{L}{R}$         c) $\sqrt{\dfrac{R}{L}}$         d) $\sqrt{\dfrac{L}{R}}$

17. The random error in the arithmetic mean of 100 observations is $x$; then random error in the arithmetic mean of 4000 observations would be

a) $4x$         b) $\dfrac{1}{4}x$         c) $2x$         d) $\dfrac{1}{2}x$

18. Which of the following is dimensionally correct

a) Pressure = Energy per unit area

b) Pressure = Energy per unit volume

c) Pressure = Force per unit volume

d) Pressure = Momentum per unit volume per unit time

19. $R$, $L$ and $C$ represent the physical quantities resistance, inductance and capacitance respectively. Which one of the following combination has dimension of frequency?

a) $\dfrac{1}{\sqrt{RC}}$         b) $\dfrac{R}{L}$         c) $\dfrac{1}{LC}$         d) $\dfrac{C}{L}$

20. If the length of a rectangle $l = 10.5$ cm, breadth $b = 2.1$ cm and minimum possible measurement by scale = 0.1 cm, then the area is

a) $22.0 \text{ cm}^2$        b) $22.1 \text{ cm}^2$        c) $22.05 \text{ cm}^2$        d) $22 \text{ cm}^2$