CHAPTER 1

Units & Measurements

Systems of Units

1. The angle of 1' (minute of arc) in radian is nearly equal to, *(2020-Covid)*

a. 4.85×10^{-4} rad
b. 4.80×10^{-6} rad
c. 1.75×10^{-2} rad
d. 2.91×10^{-4} rad

2. The unit of thermal conductivity is *(2019)*

a. $W\ m^{-1}\ K^{-1}$ b. $J\ m\ K^{-1}$
c. $J\ m^{-1}\ K^{-1}$ d. $W\ m\ K^{-1}$

Dimensions of Physical Quantities

3. Plane angle and solid angle have: *(2022)*

a. Both units and dimension
b. Units but no dimensions
c. Dimensions but no units
d. No units and no dimensions

4. The dimension $[MLT^{-2}A^{-2}]$ belong to the: *(2022)*

a. electric permittivity
b. magnetic flux
c. self inductance
d. magnetic permeability

5. If E and G respectively denote energy and gravitational constant, then $\frac{E}{G}$ has the dimensions of: *(2021)*

a. $[M][L^{-1}][T^{-1}]$ b. $[M][L^{0}][T^{0}]$
c. $[M^{2}][L^{-2}][T^{-1}]$ d. $[M^{2}][L^{-1}][T^{0}]$

6. Dimensions of stress are: *(2020)*

a. $[ML^{2}T^{-2}]$ b. $[ML^{0}T^{-2}]$
c. $[ML^{-1}T^{-2}]$ d. $[MLT^{-2}]$

Application of Dimensions

7. If force [F], acceleration [A] and time [T] are chosen as the fundamental physical quantities. Find the dimensions of energy. *(2021)*

a. $[F]\ [A]\ [T^{2}]$ b. $[F]\ [A]\ [T^{-1}]$
c. $[F]\ [A^{-1}]\ [T]$ d. $[F]\ [A]\ [T]$

8. A physical quantity of the dimensions of length hat can be formed out of c, G and $\frac{e^2}{4\pi\varepsilon_0}$ is [c is velocity of light, G is universal constant of gravitation and e is charge]: *(2017-Delhi)*

a. $c^2\left[G\frac{e^2}{4\pi\varepsilon_0}\right]^{1/2}$ b. $\frac{1}{c^2}\left[\frac{e^2}{G4\pi\varepsilon_0}\right]^{1/2}$

c. $\frac{1}{c^2}G\frac{e^2}{4\pi\varepsilon_0}$ d. $\frac{1}{c^2}\left[G\frac{e^2}{4\pi\varepsilon_0}\right]^{1/2}$

9. Planck's constant (h), speed of light in vacuum (c) and Newton's gravitational constant (G) are three fundamental constants. Which of the following combinations of these has the dimension of length? *(2016 - II)*

a. $\sqrt{\frac{hc}{G}}$ b. $\sqrt{\frac{Gc}{h^{3/2}}}$

c. $\frac{\sqrt{hG}}{c^{3/2}}$ d. $\sqrt{\frac{hG}{c^{5/2}}}$

10. If energy (E), velocity (V) and time (T) are chosen as the fundamental quantities, the dimensional formula of surface tension will be: *(2015)*

a. $[EV^{-1}T^{-2}]$ b. $[EV^{-2}T^{-2}]$
c. $[E^{-2}V^{-1}T^{-3}]$ d. $[EV^{-2}T^{-1}]$

11. If dimension of critical velocity of liquid flowing through a tube are expressed as $v_c \propto [\eta^x \rho^y r^z]$ where η, ρ and r are the coefficient of viscosity of liquid, density of liquid and radius of the tube respectively, then the values of x, y and z are given by: *(2015 - Re)*

a. 1, 1, 1 b. 1, –1, –1
c. –1, –1, 1 d. –1, –1, –1

12. If Force (F), Velocity (V) and Time (T) are taken as fundamental units, then the dimensions of mass are: *(2014)*

a. $[F\ V\ T^{-1}]$ b. $[F\ V\ T^{-2}]$

c. $[F\ V^{-1}\ T^{-1}]$ d. $[F\ V^{-1}T]$

Errors

13. The intervals measured by a clock given the following readings: 1.25 s, 1.24 s, 1.27 s, 1.21 s and 1.28 s. What is the percentage relative error in the observations? *(2020-Covid)*

a. 4% b. 16%

c. 1.6% d. 2%

14. In an experiment, the percentage of error occurred in the measurement of physical quantities A, B, C and D are 1%, 2%, 3% and 4% respectively. Then the maximum percentage of error in the measurement of X, where $X = \frac{A^2B^{1/2}}{C^{1/3}D^3}$ will be *(2019)*

a $\left(\frac{3}{13}\right)\%$ b. 16%

c. – 10% d. 10%

15. In an experiment four quantities a, b, c and d are measured with percentage error 1%, 2%, 3% and 4% respectively. Quantity P is calculated as follows $P = \frac{a^3b^2}{cd}$. % error in P is: *(2013)*

a. 4% b. 14%

c. 10% d. 7%

Significant Figures

16. The area of a rectangular field (in m^2) of length 55.3 m and breadth 25 m after rounding off the value for correct significant digits is: *(2022)*

a. 14×10^2 b. 138×10^1

c. 1382 d. 1382.5

17. Taking into account of the significant figures, what is the value of 9.99 m – 0.0099 m? *(2020)*

a. 9.98 m

b. 9.980 m

c. 9.9 m

d. 9.9801 m

Measuring Instruments

18. A screw gauge gives the following readings when used to measure the diameter of a wire

Main scale reading: 0 mm

Circular scale reading: 52 divisions

Given that 1 mm on main scale corresponds to 100 divisions on the circular scale. The diameter of the wire from the above data is: **[RC]** *(2021)*

a. 0.026 cm

b. 0.26 cm

c. 0.052 cm

d. 0.52 cm

19. A screw gauge has least count of 0.01 mm and there are 50 divisions in its circular scale.

The pitch of the screw gauge is: **[RC]** *(2020)*

a. 0.25 mm b. 0.5 mm

c. 1.0 mm d. 0.01 mm

20. A student measured the diameter of a small steel ball using a screw gauge of least count 0.001 cm. The main scale reading is 5 mm and zero of circular scale division coincides with 25 divisions above the reference level. If screw gauge has a zero error of –0.004 cm, the correct diameter of the ball is

[RC] *(2018)*

a. 0.053 cm b. 0.525 cm

c. 0.521 cm d. 0.529 cm

Answer Key

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
d	a	b	d	d	c	a	d	c	b	b	d	c	b	b	a	a
18	19	20														
c	b	d														