Chapter- 1&2

PHYSICAL WORLD AND MEASUREMENT

Very Short Answer Type Questions

01. Obtain a relation between microsecond & nanosecond.

02. The volume of a cube of side 1 cm is equal to _____ m^3.

03. The relative density of lead is 4.3. Its density is _____ gcm^{-3} or _____ kgm^{-3}.

04. G = 6.67 x 10^{-11} Nm^2 $(kg)^{-2}$ = _____ $(cm)^3$. S^{-2}. g^{-1}.

05. Define parsec.

06. Name four units used in the measurement of extremely short distances.

Short Answer Type Questions (2 marks):

07. State four physical quantities having the same dimensional formula.

08. Classify physical quantities based on dimensions.

09. Check the correctness of the equations. (i) v = u + at   (ii) $S = ut + \dfrac{1}{2}at^2$

(iii) $v^2 - u^2 = 2as$ (iv) $T = 2\pi\sqrt{4}g$

10. If the unit of length, mass & time each be doubled. What increase in the unit of work takes

place?

11. The velocity of a particle is given by $v = a + \dfrac{b}{t} + ct^2$ where a, b & c are constant. Find the

unit and dimensional formula of a, b & c.

12. If $force = \dfrac{x}{density} + c$ is it dimensionally correct? Find the dimension of $'x'$?

13. In the gas equation $\left[p + \dfrac{a}{V^2} \right][V - b] = RT$, where 'T' is absolute temperature, 'p' is the pressure & 'V' is volume. What are the dimensions of constants 'a' & 'b'?

14. Convert force of 15 dynes into newton dimensionally.

15. The density of water in the C.G.S system is 1 g/cm^3. Find its value in the SI system dimensionally.

16. $y = \dfrac{x}{acceleration} \sin\left[\dfrac{x.force}{velocity} \right]$, find the units of x.

17. A book with many printing errors contains four different formulas for the displacement y of a particle undergoing a certain periodic motion.

(a) $y = a \sin 2\pi t / T$ 　　　　　(b) $y = a \sin vt$

(c) $y = (a/T) \sin \dfrac{t}{a}$ 　　　　(d) $y = (a/\sqrt{2})\left(\sin \dfrac{2\pi t}{T} + \cos \dfrac{2\pi t}{T} \right)$

(a = maximum displacement of particle, v = speed of the particle, T = time period of motion). Role out the wrong formulas on dimensional grounds.

18. When the planet Jupiter is at a distance of 824.7 million kilometers from Earth, its angular diameter is measured to be 35.72" of arc. Calculate the diameter of Jupiter.

19. $\text{Pr}essure = \dfrac{y^2}{velocity} \log\left\{ \dfrac{x \times force}{z^2} + \dfrac{y}{z} \right\}$, so, find x, y & z dimensionally.

20. Check the correctness of the equation, $V = \sqrt{\dfrac{2GM}{R}}$, where 'V' is escape velocity, G = gravitational constant, M is the mass of earth & R is the radius of Earth.

21. Check the accuracy of the equation $\lambda = \dfrac{h}{m^2 V}$, where, is the wavelength, 'h' is the Planck's constant, 'm' is the mass & 'V' is the velocity.

22. The centripetal force depends on the mass of the planet, radius of the orbit & velocity of the planet. To derive an expression for the centripetal force with the help of dimensional analysis.

23. Force of viscosity (F) acting on a spherical body moving through a fluid depends upon its velocity (v), radius (r) & co-efficient of viscosity (η) of fluid. Find an expression for F using dimensional analysis.

__Long Answer Type Questions (5 marks)__

24. We measure the period of oscillation of a simple pendulum. In successive measurements, the readings turn out to be 2.63 s, 2.56 s, 2.42 s, 2.71s, 2.80s. Calculate the absolute error, relative error & % error.

25. Two forces F_1 & F_2 acting simultaneously on a particle are measured as follows, $F_1 = (36 \pm 0.3) N$, $F_2 = (23 \pm 0.5) N$. What will be the resultant if they act in the same direction & opposite direction?

26. The sides of a rectangle are measured to be $(20 \pm 0.2) m$ & $(10 \pm 0.1) m$. Find the perimeter of a rectangle with error limits.

27. Focal lengths of spherical mirrors can be measured to be (3.5 ± 0.1) cm & (2.5 ± 0.2) cm.

Calculate the sum & difference in their focal length with error limits.

28. Two resistances $(5.1\pm 0.03)\Omega$ and $(2.6\pm 0.03)\Omega$ are connected in series in a circuit.

Calculate the total resistance of the circuit with error limits.

29. Determine the area of a platform whose length and breadth are measured as (123 ± 0.5)

m & (75 ± 0.3)m.

30. Find the relative error in Z if $Z = \dfrac{A^4 B^{1/3}}{CD^{3/2}}$.

31. Describe four fundamental forces in nature.