Blue Print (As per PU Board)

Topic	1 mark questions	2 marks questions	3 marks questions	5 marks questions	Total Marks
Units & Measurements	1	1	–	–	3

One mark questions

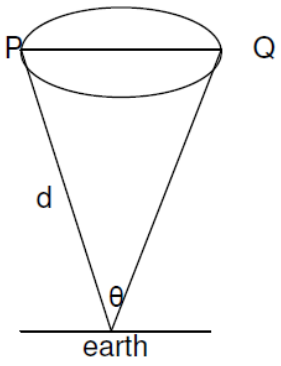
1. **What is a physical quantity?**
   Answer: Any quantity which can be measured is called a physical quantity
2. **What is a unit**
   Answer: A certain basic, arbitrarily chosen, internationally accepted standard of reference for making measurements of a physical quantity is called a unit.
3. **Which are fundamental or basic units?**
   Answer: The unit of fundamental quantities is called fundamental units
4. **Express the relation for angle in a plane.**
   Answer: A: solid angle $(d\Omega) = \dfrac{\text{area}(dA)\text{of spherical surface}}{\text{square of radius } (r^2)}$

Two marks questions

5. **Mention the base quantities in SI system**
   Answer: Length, mass , time, electric current, thermodynamic temperature, amount of substance and luminous intensity
6. **Name any two derive SI unit with the name of scientist.**
   Answer: newton , joule, watt etc (any two)
7. **What are sources of systematic error?**
   Answer: (i) Instrumental error (ii) imperfection in experimental procedure
   (iii) personal error
8. **The distance 'D' of the sun from the earth is** 1.496×10^{11}m. **If sun's angular diameter is** 9.31×10^{-3}rad **as measured from earth, find the diameter of the sun.**
   Answer: Sun's diameter $d = \propto D$
   $= \left(9.31\times10^{-3}\right)\times1.496\times10^{11}$
   $= 1.39\times10^{9}$m

Five marks questions

9. **Explain parallax method of determining the size of moon.**
   Answer: Let 'D' be the diameter of the moon, when moon is observed from a place 'E' on earth, let θ be the angle made by two diametrically opposite ends P and Q of the moon called parallax angle. If 'd' is the distance of moon from earth , then
   $\theta = \dfrac{PQ}{d} = \dfrac{D}{d}$
   $\therefore D = d$
   Using this relation the size of moon can be determined



10. **The period of oscillation of a simple pendulum is $T = 2\pi\sqrt{\frac{L}{g}}$. The measured value of L is $20.0\,\text{cm}$ known to $1\,\text{mm}$ accuracy and time for 100 oscillations of the pendulum is found to be $90\,\text{s}$ using a watch of $1\,\text{s}$ resolution. Find accuracy in % error.**

Answer: We have $g = 4\pi^2 \frac{L}{T^2}$

Here, $T = \frac{t}{n}$ and $\Delta T = \frac{\Delta t}{n}$.

$\therefore \frac{\Delta T}{T} = \frac{\Delta t}{t}$

Here errors are least count errors

$\frac{\Delta g}{g} = \left(\frac{\Delta L}{L}\right) + 2\left(\frac{\Delta T}{T}\right)$

$= \frac{0.1}{20.0} + 2\left(\frac{1}{90}\right)$

$= 0.027$

Thus percentage error in g is $100 \times \frac{\Delta g}{g} = 100 \times 0.027 = 2.7\%$

11. **Check the correctness of following equation by dimensional analysis.**

Answer: $x = x_0 + v_0 t + \frac{1}{2}at^2$

For LHS, dimension of $x = [L]$

For RHS, dimension of $x_0 = [L]$

dimension of $v_0 t = \left[LT^{-1}\right][T] = [L]$

dimension of $\frac{1}{2}\text{at}^2 = \left[LT^{-2}\right]\left[T^2\right] = [L]$ here $1/2$ is a constant having no dimension.

$\therefore [L] = [L] + [L] + [L]$ i.e. the dimensions of each term on both sides of the equation are the same. Thus the equation is dimensionally correct.

12. **Check the correctness of following equation by dimensional analysis.**

$Fx = \frac{1}{2}mv^2 - \frac{1}{2}mv^2$

Answer: Where F – force, x – distance, v_0 – initial velocity, v – final velocity

Consider $Fx = \frac{1}{2}mv^2 - \frac{1}{2}mv_0^2$

For LHS, dimension of $Fx = \left[M\,LT^{-2}\right][L] = \left[M\,L^2T^{-2}\right]$

For RHS, dimensions of $\frac{1}{2}mv^2 = [M]\left[LT^{-1}\right]^2 = \left[M\,L^2T^{-2}\right]$

Similarly, dimensions of $\frac{1}{2}mv_0^2 = [M]\left[LT^{-1}\right]^2 = \left[M\,L^2T^{-2}\right]$.

Where $\frac{1}{2}$ is a constant, has no dimension.

$\therefore \left[M\,L^2T^{-2}\right] = \left[M\,L^2T^{-2}\right] - \left[M\,L^2T^{-2}\right]$

Since dimensions of each term on both sides of the equation are the same. Thus the equation is dimensionally correct.