



UNITS AND MEASUREMENT

Test Paper-III

MAX MARKS: 30

TIME: 90Mts

- 1 The period of oscillation of a simple pendulum is $T = 2\pi\sqrt{\frac{L}{g}}$. Measured value of $L = 20.0\text{cm}$ known to 1mm accuracy and time for 100 oscillations of the pendulum is found to be 90s using a wrist watch of 1 s resolution. What is the accuracy in the determination of g ? [3]
- 2 Give any four rules that applied in determining the number of significant figures with examples. [2]
- 3 The mass of an object is measured to be 4.237g and its volume is measured to be 2.51cm³, then find the density of the substance with significant figures stating the reason for significant figures [3]
- 4 State the rules for Arithmetic Operations with significant figures giving examples [2]
- 5 State the rules for Rounding off the Uncertain Digits with examples [2]
- 6 Each side of a cube is measured to be 7.203m. What are the total surface area and the volume of the cube to appropriate significant figures? [2]
- 7 State the rules for determining the Uncertainty in the Results of Arithmetic Calculations with examples. [3]
- 8 What is Dimensional formula and dimensional equation. [2]
- 9 Consider an equation $\frac{1}{2}mv^2 = mgh$ where m is the mass of the body, v its velocity, g is the acceleration due to gravity and h is the height. Check whether this equation is dimensionally correct. [2]
- 10 The SI unit of energy is $\text{J} = \text{kg m}^2 \text{s}^{-2}$; that of speed v is ms^{-1} and of acceleration a is ms^{-2} . Which of the formulae for kinetic energy (K) given below can you rule out on the basis of dimensional arguments (m stands for the mass of the body);
 - a. $K = m^2v^3$
 - b. $K = (1/2)mv^2$
 - c. $K = ma$
 - d. $K = (3/16)mv^2$ $K = (1/2)mv^2 + ma$ [3]
- 11 Consider a simple pendulum, having a bob attached to a string, which oscillates under the action of the force of gravity. Suppose that the period of oscillation of the simple pendulum depends on its length (l), mass of the bob (m) and acceleration due to gravity (g). Derive the expression for its time period using the method of dimensions. [3]
- 12 State the principle of homogeneity of dimensions in an equation. Also give any two limitations of dimensional analysis.