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Questions:

5 Marks

1. (i) Explain the use of screw gauge and vernier caliper in measuring smaller distances.
   (ii) Write a note on triangulation method and radar method to measure larger distances
2. Explain in detail the various types of errors.
3. What do you mean by propagation of errors? Explain the propagation of errors in addition and multiplication.
4. Explain the principle of homogeniety of dimensions. What are its uses? Give example
5. Explain the principle of homogeneity of dimensions and derive an expression for the force F acting on a body moving in a circular path depends on mass of the body (m), velocity (v) and radius (r) of the circular path. Obtain the expression for the force by dimensional analysis method. (Take the value of k = 1)

3 Marks

6. Briefly explain the types of physical quantities.
7. What are the limitations of dimensional analysis?
8. In a submarine equipped with sonar, the time delay between the generation of a pulse and its echo after reflection from an enemy submarine is observed to be 80 sec. If the speed of sound in water is 1460 ms^{-1}. What is the distance of enemy submarine?
9. Assuming that the frequency γ of a vibrating string may depend upon
   (i) applied force (F)
   (ii) length (I)
   (ill) mass per unit length (m), prove that $\gamma \alpha \frac{1}{l}\sqrt{\frac{F}{m}}$ using dimensional analysis.
10. From a point on the ground, the top of a tree is seen to have an angle of elevation 60^{o} . The distance between the tree and a point is 50m. calculate the height of the tree?
11. The Moon subtends an angle of 1^{0} 55′ at the base line equal to the diameter of the earth. What is the distance of the Moon from the Earth? (Radius of the Earth is 6.4×10^{6}m)
12. In a series of successive measurements in an experiment, the readings of the period of oscillation of a simple pendulum were found to be 2.63s, 2.56s, 2.42s, 2.71s, and 2.80s.
    Calculate
    (i) the mean value of the period of oscillation
    (ii) the absolute error in each measurement
    (iii) the mean absolute error
    (iv) the relative error
    (v) the percentage error.
    (vi) Express the result in proper form.
13. Two resistances R_1 = (100 ± 3) Ω, R_2 = (150 ± 2)Ω, are connected in series. What is their equivalent resistance?
14. The temperatures of two bodies measured by a thermometer are t_1 = (20 + 0.5)°C, t_2 = (50 ± 0.5)°C. Calculate the temperature difference and the error therein.
15. The length and breadth of a rectangle are (5.7 ± 01.) cm and (3.4 ± 02.) cm respectively. Calculate the area of the rectangle with error limits.
16. The voltage across a wire is (100 ± 5)V and the current passing through it is (10 ± 0.2) A. Find the resistance of the wire.
17. Obtain an expression for the time period T of a simple pendulum. The time period T depend upon
    (i) mass 'm' of the bob
    (ii) length 'l' of the pendulum and
    (iii) acceleration due to gravity g at the place where the pendulum is suspended. (Constant k = 2π) i.e
18. If the value of universal gravitational constant in SI is 6.6 x 10^{-11} Nm^2 kg^{-2}, then find its value in CGS System?