SUNCITY SCHOOL
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ERROR ANALYSIS

1. The percentage error in determining the area of a rectangular plate is 2%. If the error in the measurement of length is 1.2%, what is the percentage error in the breadth?
2. In an experiment, the value of refractive index of glass was found to be 1.54, 1.53, 1.44, 1.54, 1.56, and 1.45 in successive measurements. Calculate
   a) The most accurate value of refractive index
   b) Relative error
   c)Mean absolute error
   d)Percentage error
3. The length of the plastic tube of refill of a pen is (12.7 ± 0.1) cm and the length of the metal nib is(1.4 ± 0.1)cm. What is the total length of refill?
4. The length and breadth of a rectangular lamina are measured to be (2.3 ± 0.2) cm and (1.6 ± 0.1) cm. Calculate the area and perimeter with error limits?
5. A potential difference of V= (100 ± 2) volt, when applied across a resistance gives a current of (10 ± 0.5) A. Find the value of resistance along with the permissible percentage error.
6. A physical quantity Z is calculated from the following relation: $Z=A^4B^{1/3} / CD^{3/2}$. If the percentage error in measuring A, B, C and D are 1%, 3%, 2% and 4% respectively, then find the percentage of error in Z.
7. The time period of oscillations of a sample pendulum is $T = 2\pi (L/g)^{1/2}$
   a) In finding the value of g, which quantity should be measured more accurately and why?
   b) If L is measured to be 20.0 cm known to 1mm accuracy and time for 100 oscillations of the pendulum is found to be 90s using a watch of 1s resolution. What is the accuracy in the determination of g?
8. A stone weight 10.0 $\pm$ 0.1 kg in air. The weight of the same stone in water is 5.0 $\pm$ 0.1 kg. Find the maximum percentage error in the measurement of specific gravity.
9. The percentage error in the measurement of mass and speed are 3% and 2% respectively. What will be the error in the measurement of kinetic energy and momentum?
10. The external and internal diameters of a hollow cylinder are determined and the results are recorded as (4.23 ± 0.01) cm and (3.8 ± 0.01) cm. Determine the thickness of the cylinder wall with limits of error.
11. Two resistors of resistance $R_1 = (10 \pm 0.1)\ \Omega$ are connected in a) series b) parallel. Find the equivalent resistance in both of the combinations with limits of possible percentage error.
12. To study the flow of a liquid through a narrow tube, the following formula is used $V = \pi\rho r^4 / 8\eta L$. The value of p, r, V and L are 78 cm of Hg, 0.28 cm, 1.2 cm^3 /s and 18.2 cm respectively. These quantities are measured to the accuracies of 0.5 cm of Hg, 0.01 cm, 0.1 cm^3 /s and 0.1 cm respectively. Find the percentage error in determining the value of η.