St. Lawrence High School

A Jesuit Christian Minority Institution

Term : 1st

Work Sheet – 2

Class – XI | Subject – Physics | Date – 16.06.20

Chapter – Units, Dimension & Error Analysis | Topic – Error calculation

---

Choose the correct option for the following questions. $1 \times 15 = 15$

1. The length of a rod is measured by five students as 4.9cm, 4.9cm, 5.0cm, 5.1cm and 5.1cm. The mean absolute error in this measurement is –
   a. 0 cm
   b. 0.08 cm
   c. 0.1 cm
   d. 0.016 cm

2. The relative error in the above case is –
   a. 0 cm
   b. 0.08 cm
   c. 0.1 cm
   d. 0.016 cm

3. While measuring the radius of a sphere, five students record it as 3cm, 3.01cm, 2.99cm, 2.99cm and 3.01cm. what will be the absolute error in the measurement of its volume ?
   a. 0.7 cm^3
   b. 0.8 cm^3
   c. 0.9 cm^3
   d. 1.0 cm^3

4. In the above case what will be the percentage error?
   a. 0.8 %
   b. 0.5 %
   c. 0.4 %
   d. 8 %

5. Two resistors are connected in series with values $(5 \pm 0.05)\ \Omega$ and $(3 \pm 0.3)\Omega$. What will the equivalent resistance of this combination with error estimation?
   a. $(8 \pm 0.08)\ \Omega$
   b. $(8 \pm 0.35)\ \Omega$
   c. $(2 \pm 0.08)\ \Omega$
   d. $(2 \pm 0.35)\ \Omega$

6. In the above case, what will be the percentage error?
   a. 0.4375 %
   b. 4.735 %
   c. 4.375 %
   d. None of these

7. Percentage error in the measurement of mass and speed are 2% and 3% respectively. The error in the estimate of kinetic energy obtained by measuring mass and speed will be –
   a. 12%
   b. 10%
   c. 8%
   d. 2%

8. The density of a cube is measured by measuring its mass and length of one side. if the maximum error in the measurement of mass and length are 4% and 3% respectively, the maximum error in the measurement of density will be –
   a. 7%
   b. 9%
   c. 12%
   d. 13%

9. A force F is applied on a square plate of side L. If the percentage error in the determination of L is 2% and that in F is 4%, what is the error in pressure?
   a. 8%
   b. 6%
   c. 4%
   d. 2%

10. By what percentage should the pressure of a given mass of gas be increased, so as to decrease its volume by 10% at a constant temperature?
   a. 11.1%
   b. 10.1%
   c. 9.1%
   d. 8.1%

11. If momentum of a particle is increased by 100%, then percentage increase in its kinetic energy will be –
   a. 400%
   b. 300%
   c. 100%
   d. 200%

12. If the error introduced to measure the resistance, current and time are 1%, 2% and 1% respectively, then the maximum error in the calculation of heat produced due to the flow of current is –
   a. 8%
   b. 6%
   c. 18%
   d. 12%

13. The length and breadth of a rectangular plane is given as, $l = (20 \pm 0.2)cm$ and $b = (10 \pm 0.1)cm$. If the area is determined by this data, then the mean absolute error in measurement of area will be –
   a. $0.02\ m^2$
   b. $0.01m^2$
   c. $2m^2$
   d. $4m^2$

14. A physical quantity P is calculated by measuring $a, b, c \; and \; d$ with the help of the relation $P = \frac{a^3 b^2}{\sqrt{c}\, d}$. If the error introduced in the measurement of $a, b, c \; \& \; d \; are \; 1\% , 3\% , 4\% \; and \; 2\%$ respectively, then wjat will be percentage error in the calculation of P?
    a. 1.3 %
    b. 13%
    c. 3.1%
    d. 31%

15. The acceleration due to gravity g is calculated with the help of simple pendulum by measuring the length of thread of the pendulum l and the time period of oscillation T, where $T = 2\pi\sqrt{\frac{l}{g}}$. If the measured value of l is 20cm with an error of 1mm and the measured value of T is 90 s with an error of 1s, then the percentage error in the calculation of g is –
    a. 0.027 %
    b. 0.27 %
    c. 2.7 %
    d. 27%

Name of the teacher – Soumitra Maity