1. Time for 20 oscillations of a pendulum is measured as $t_1 = 39.6$ s; $t_2 = 39.9$ s. What is the precision in the measurements ? What is the accuracy of the measurement?

2. You measure two quantities as A = 1.0 m $\pm$ 0.2 m, B = 2.0 m $\pm$ 0.2 m . We should report correct value for $\sqrt{AB}$ as

(a) 1.4 m $\pm$ 0.4 m (b) 1.4 m $\pm$ 0.15 m (c) 1.4 m $\pm$ 0.3 m (d) 1.4 m $\pm$ 0.2 m

3. Which of the following measurements is most precise ?

(a) 5.00 mm (b) 5.00 cm (c) 5.00 m (d) 5.00 km

4. The mean length of an object is 5 cm. Which of the following measurements is most accurate

(a) 4.9 cm (b) 4.805 cm (c) 5.25 cm (d) 5.4 cm

5. A body travels uniformly a distance of (13.8 ± 0.2) m in a time (4.0 ± 0.3)s. The velocity of the body within error limits is

(a) (3.45 $\pm$ 0.2) ms^{-1} (b) (3.45 $\pm$ 0.3) ms^{-1} (c) (3.45 $\pm$ 0.4) ms^{-1} (d) (3.45 $\pm$ 0.5) ms^{-1}

6. The percentage erroor in the abaove problem is

(a) 7% (b) 5.95 % (c) 8.95% (d) 9.85%

7. A physical parameter a can be determined by measuring the parameters b,c,d and e using the relation $a = \frac{b^{\alpha} c^{\beta}}{d^{\gamma} e^{\delta}}$. If the maximum errors in the measurements of b,c, d and e are b_1 %, c_1%, d_1% and e_1%, then the maximum error in the value of a determined by the experiment is

(a) $(b_1 + c_1 + d_1 + e_1)$ % (b) $(b_1 + c_1 - d_1 - e_1)$ %

(c) $(\alpha b_1 + \beta c_1 + \gamma d_1 - \delta e_1)$ % (d) $(\alpha b_1 + \beta c_1 + \gamma d_1 + \delta e_1)$ %

8. The period of oscillation of a simple pendulum in the experiment is recorded as 2.63s, 2.56s, 2.42s, 2.71 s and 2.80s respectively. The average absulute error is

(a) 0.1s (b) 0.11 s (c) 0.01 s (d) 1.0s

9. The length of a cylinder is measured with a meter rod having least count 0.1 cm. Its diameter is measured with vernier calipers having least count 0.01 cm. Given that length is 5.0 cm and radius is 2.0 cm. The percentage error in the calculated value of the volume will be

(a) 1% (b) 2% (c) 3% (d) 4%

10. If there is a positive error of 50% in the measurement of velocity of a body, then the error in the measurement of kinetic energy is

(a) 25% (b) 50% (c) 100% (d) 125%

11. The side of a cube is measured by Vernier callipers (10 divisions of the vernier scale coincide with 9 divisions of the main scale, where 1 division of main scale is 1 mm). The main scale reads 10 mm and first divisions of vernier scale coincides with the main scale. The mass of the cube is 2.736g. Find density of the cube in appropriate significant figures.

12. A Vernier callipers has 1 mm marks on the main scale. It has 20 equal divisions on the vernier scale, which match with 16 main scale divisions. For this Vernier callipers, the least count is
(a) 0.2 mm (b) 0.05 mm (c) 0.1 mm (d) 0.2 mm

13. The effective length of a simple pendulum is the sum of the following three: length of string, radius of bob, and length of hook,
In a simple pendulum experiment, the length of the string, as measured by a meter scale, is 92.0 cm. The radius of the bob combined with the length of the hook, as measured by a vernier callipers, is 2.15 cm. The effective length of the pendulum is
(a) 94.1 cm (b) 94.2 cm (c) 94.15 cm (d) 94 cm

14. The diameter of a cylinder is measured using a Vernier callipers with no zoro error. It is found that the zero of the Vernier scale lies between 5.10 cm and 5.15 cm of the main scale. The Vernier scale has 50 divisions equivalent to 2.45 cm. The 24th division of the Vernier scale exactly coincides with one of the main scale divisions. The diameter of the cylinder is
(a) 5.112 cm (b) 5.124 cm (c) 5.136 cm (d) 5.148 cm

15. A student uses a simple pendulum of exactly 1 m length to determine g, the acceleration due to gravity. He uses a stop watch with the least count of 1 s for this and records 40s for 20 oscillations. For this observation, which of the following statements(s) is (are) true ?
(a) Error ΔT in measuring T, the time period is 0.05s
(b) Error ΔT in measuring T, the time period is 1s
(c) Percentage error in the determination of g is 5%
(d) Percentage error in the determination of g is 2.5%

16. Plank's contant h, speed of light c and gravitational constant G are used to from a unit of length L and a unit of mass M. Then the correct options(s) is (are)
(a) $M \propto \sqrt{c}$ (b) $\propto \sqrt{G}$ (c) $L \propto \sqrt{h}$ (d) $L \propto \sqrt{G}$

17. To find the distance d over which a signal can be seen clearly in foggy conditions, a railways engineer uses dimensional ananlysis and assumes that the distance depends on the mass density ρ of the fog.intensity (power/area)S of the light from the signal and its frequency f. This engineer finds that d is proportional to $S^{1/n}$. The values of n is

18. The number of significant figures in 0.06900 is
(a) 5 (b) 4 (c) 2 (d) 3

Answers Key

1.Ans. Accuracy of measurement $= \pm 0.2$s 2. (d) 3. (a) 4. (a) 5. (b)
6. (c) 7. (d) 8. (b) 9. (b) 10. (d) 11. 2.66 g cm^{-3}
12. (d) 13. (b) 14. (b) 15. (a),(c) 16. (a),(c),(d) 17. 3. 18. (b)