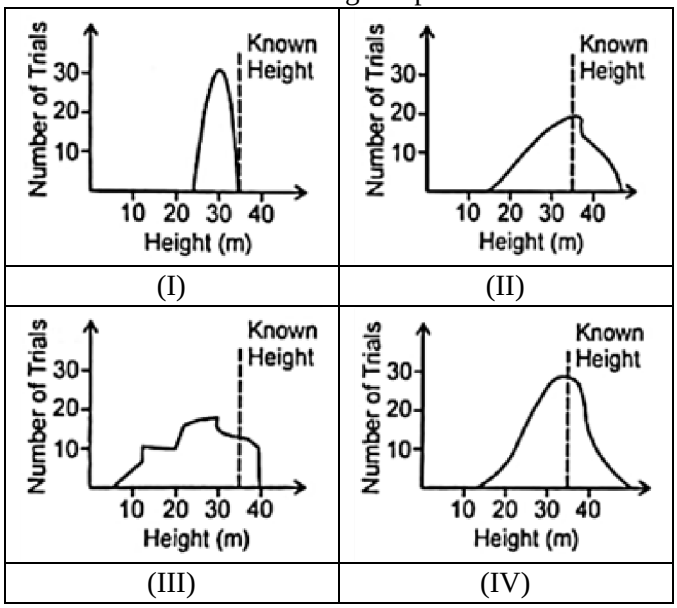
SECTION A

1 The length of the rod is (12 ± 0.4) m. A section of length (5 ± 0.2) m is cut from it. What is the remaining length?

1. (7 ± 0.2) m
2. (7 ± 0.8) m
3. (7 ± 0.6) m
4. (7 ± 0.1) m

2 Four students measure the height of a tower. Each student uses a different method and each measures the height many times. The data for each are plotted below. The measurement with the highest precision is:



1. I
2. II
3. III
4. IV

3 The SI unit of a physical quantity is pascal-second. The dimensional formula of this quantity will be:

1. $[ML^{-1}T^{-1}]$
2. $[ML^{-1}T^{-2}]$
3. $[ML^{2}T^{-1}]$
4. $[M^{-1}L^{3}T^{0}]$

4 Planck's constant (h), speed of light in the vacuum (c), and Newton's gravitational constant (G) are three fundamental constants. Which of the following combinations of these has the dimension of length?

1. $\frac{\sqrt{hG}}{c^{3/2}}$
2. $\frac{\sqrt{hG}}{c^{5/2}}$
3. $\frac{\sqrt{hG}}{G}$
4. $\frac{\sqrt{Gc}}{h^{3/2}}$

5 If $x = 10.0 \pm 0.1$ and $y = 10 \pm 0.1$, then $2x - 2y$ with consideration of significant figures is equal to:

1. zero
2. 0.0 ± 0.1
3. 0.0 ± 0.2
4. 0.4 ± 0.4

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

1. 4.9 cm
2. 4.805 cm
3. 5.25 cm
4. 5.4 cm

7 In Vander Wall's equation $\left[\mathrm{P} + \frac{\mathrm{a}}{\mathrm{V}^2}\right][\mathrm{V} - \mathrm{b}] = \mathrm{RT}$; P is pressure, V is volume, R is universal gas constant and T is temperature. The ratio of constants $\frac{a}{b}$ is dimensionally equal to:

1. $\frac{P}{V}$
2. $\frac{V}{P}$
3. PV
4. PV^3

8 Plane angle and solid angle have:

1.	both units and dimensions
2.	units but no dimensions
3.	dimensions but no units
4.	no units and no dimensions

9 The physical quantity that has the same dimensional formula as pressure is:

1. Force
2. Momentum
3. Young's modulus of elasticity
4. Coefficient of viscosity

10 Match **List-I** with **List-II**.

List-I	List-II
A. torque	**I.** N-m s^{-1}
B. stress	**II.** J-kg^{-1}
C. latent Heat	**III.** N-m
D. power	**IV.** N-m^{-2}

Choose the correct answer from the options given below:

1.	A-III, B-II, C-I, D-IV
2.	A-III, B-IV, C-II, D-I
3.	A-IV, B-I, C-III, D-II
4.	A-II, B-III, C-I, D-IV

11 In the expressions below: g = gravitational acceleration; h = height; m = mass; R = electrical resistance; t = time; v = velocity; V = voltage. Which of the following expressions have units of power?

(a) $\frac{mv^2}{2t}$

(b) $\frac{V^2}{R}$

(c) $\frac{mgh}{t}$

1.	(a) and (b) only
2.	(a) only
3.	(b) and c) only
4.	(a), (b) and (c)

12 Consider the efficiency of Carnot's engine is given by $\eta = \frac{\alpha\beta}{\sin\theta}\log_e \frac{\beta x}{kT}$, where α and β are constants. If T is temperature, k is Boltzman constant, θ is angular displacement and x has the dimensions of length. Then, choose the incorrect option.

1.	Dimensions of β are same as that of force.
2.	Dimensions of $\alpha^{-1}x$ are same as that of energy.
3.	Dimensions of $\eta^{-1}sin\theta$ are same as that of $\alpha\beta$.
4.	Dimensions of α same as that of β.

13 Given below are two statements:

Assertion (A):	A dimensionally incorrect equation cannot ever be correct.
Reason (R):	Physically correct equations must be dimensionally correct.

1.	Both **(A)** and **(R)** are true and **(R)** is the correct explanation of **(A)**.
2.	Both **(A)** and **(R)** are true but **(R)** is not the correct explanation of **(A)**.
3.	**(A)** is true but **(R)** is false.
4.	Both **(A)** and **(R)** are false.

14 Suppose the kinetic energy of a body oscillating with amplitude A and at distance x is given by $K = \frac{Bx}{(A^2+x^2)}$. The dimensions of B are same as that of:

1. power
2. work $\times$ distance
3. force
4. work $\times$ time

15 Time taken by a pendulum to complete 10 oscillations is 35.2 seconds. What is the time period of a pendulum in seconds with appropriate significant figures?

1. 3.52 s
2. 3.5 s
3. 3.520 s
4. 3.6 s

16 The number of significant figures in the physical quantity 2.56×10^5 kg is:

1. 1
2. 2
3. 3
4. 5

17 The number of significant figures in the result of $(10.04 + 0.00230)$ is:

1. 1
2. 2
3. 3
4. 4

SECTION B

18 The length, breadth, and thickness of a rectangular sheet of metal are 4.234 m, 1.005 m, and 2.01 cm respectively. The volume of the sheet to correct significant figures is:
1. $0.00856\ \text{m}^3$
2. $0.0856\ \text{m}^3$
3. $0.00855\ \text{m}^3$
4. $0.0855\ \text{m}^3$

19 The radius of a circle is stated as 2.12 cm. Its area should be written as:
1. $14\ \text{cm}^2$
2. $14.1\ \text{cm}^2$
3. $14.11\ \text{cm}^2$
4. $14.1124\ \text{cm}^2$

20 Taking into account the significant figures, what is the value of $(9.99\ \text{m} - 0.0099\ \text{m})$?
1. 9.98 m
2. 9.980 m
3. 9.9 m
4. 9.9801 m

21 A specially designed Vernier calliper has the main scale least count of 1 mm. On the Vernier scale, there are 10 equal divisions and they match with 11 main scale divisions. Then, the least count of the Vernier calliper is:
1. 0.1 mm
2. 0.909 mm
3. 1.1 mm
4. 0.09 mm

22 5.74 g of a substance occupies $1.2\ \text{cm}^3$. Its density by keeping the significant figures in view is:
1. $4.7333\ \text{g/cm}^3$
2. $3.8\ \text{g/cm}^3$
3. $4.8\ \text{g/cm}^3$
4. $3.7833\ \text{g/cm}^3$

23 The least count of vernier callipers is 0.1 mm. The main scale reading before the zero of the vernier scale is 10 and the zeroth division of the vernier scale coincides with any main scale division. If the value of one main scale division is 1 mm, the measured value should be expressed as:
1. 0.010 cm
2. 0.001 cm
3. 0.1 cm
4. 1.00 cm

24 The angle of $1'$ (minute of arc) is nearly: (Given, $2\pi = 360^0$ and $\pi = 3.14$)
1. 2.42×10^{-6} rad
2. 2.85×10^{-6} rad
3. 2.91×10^{-4} rad
4. 1.75×10^{-2} rad

25 A screw gauge of pitch 0.5 mm is used to measure the diameter of uniform wire of length 6.8 cm, the main scale reading is 1.5 mm and circular scale reading is 7. The calculated curved surface area of wire to appropriate significant figures is:
[Screw gauge has 50 divisions on the circular scale]
1. $6.8\ \text{cm}^2$
2. $3.4\ \text{cm}^2$
3. $3.9\ \text{cm}^2$
4. $2.4\ \text{cm}^2$

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