

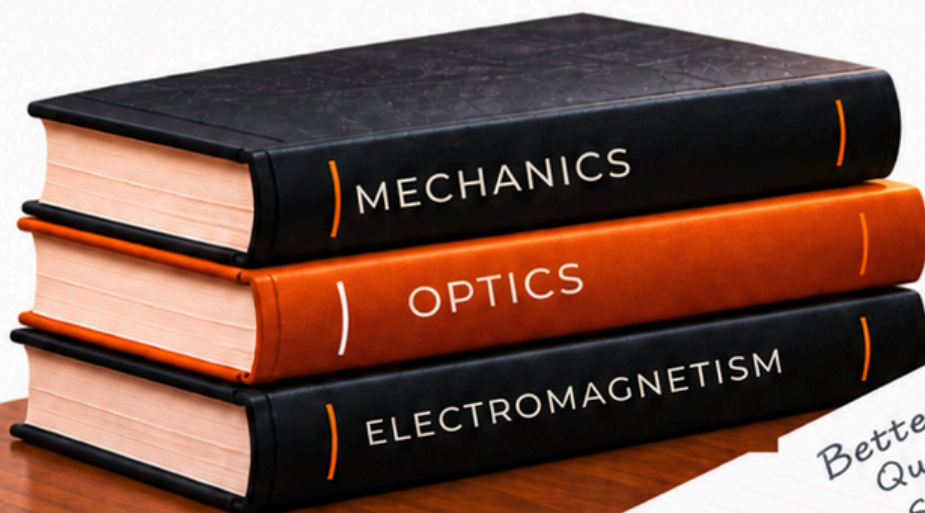
JEE Main Physics

Errors in measurements PYQ

$$F = ma$$



$$v = u + at$$



PRACTICE
TODAY
A BRIGHTER
TOMORROW

Subject: Physics

Years: 2026-2012

Total Questions: 70

About this PYQ collection

What is inside

A complete topic-wise set of **70 previous year questions** on **Errors in measurements** from **JEE Main (2026-2014)** and its predecessor **AIEEE (2012-2012)**, across **14 exam years**. **57 questions** are from 2019 onwards, so most of the set reflects the recent NTA pattern.

Questions are arranged to reduce unused page space, with newest-first priority and continuous numbering from 1. Each carries an exam date and shift tag to trace the original paper.

Topic-wise questions

TOPIC	QS	%
Errors in measurements	70	100%

Question types

TYPE	QS	%
Single-correct MCQ	56	80%
Multiple-correct MCQ	1	1%
Numerical value	13	19%

Numerical-value questions have no options; all 13 are from 2020 onwards.

How these questions help you

- **Know where the marks are:** errors in measurements make up **70 of 70 questions (about 100%)**.
- **Build speed and accuracy:** short, formula-driven questions ideal for quick practice.
- **Learn the patterns:** the same question styles return year after year.
- **Strengthen other chapters:** dimensions and error estimation are used across Physics.

Questions – Errors in measurements

1. The density ρ of a uniform cylinder is determined by measuring its mass m , length l and diameter d . The measured values of m, l and d are 97.42 ± 0.02 g, 8.35 ± 0.05 mm and 20.20 ± 0.02 mm, respectively. Calculated percentage fractional error in ρ is ____ .
(6 Apr 2026 | Shift 1)
- (A) 0.63% (B) 0.82%
(C) 0.72% (D) 0.25%
-
2. The percentage error in the calculated volume of a sphere, if there is 2% error in its diameter measurement, is ____ .
(6 Apr 2026 | Shift 2)
- (A) 1 (B) 2
(C) 6 (D) 8
-
3. In an experiment to determine the resistance of a given wire using Ohm's law, the voltmeter and ammeter readings are noted as 10 V and 5 A , respectively. The least counts of voltmeter and ammeter are 500 mV and 200 mA , respectively. The estimated error in the resistance measurement is ____ Ω
(5 Apr 2026 | Shift 2)
- (A) 0.25 (B) 2
(C) 2.5 (D) 0.18
-
4. The diameter of a wire measured by a screw gauge of least count 0.001 cm is 0.08 cm. The length measured by a scale of least count 0.1 cm is 150 cm. When a weight of 100 N is applied to the wire, the extension in length is 0.5 cm, measured by a micrometer of least count 0.001 cm. The error in the measured Young's modulus is $\alpha \times 10^9$ N/m². The value of α is ____ .
(Ignore the contribution of the load to Young's modulus error calculation)
(2 Apr 2026 | Shift 1)
- (A) 1.3 (B) 1.65
(C) 0.13 (D) 0.25
-
5. A physical quantity Q is related to four observables a, b, c, d as follows :
 $Q = \frac{ab^4}{cd}$
where, $a = (60 \pm 3)$ Pa; $b = (20 \pm 0.1)$ m; $c = (40 \pm 0.2)$ Nsm⁻² and $d = (50 \pm 0.1)$ m,
then the percentage error in Q is $\frac{x}{1000}$, where $x =$ ____ .
(29 Jan 2025 | Shift 2)

6. The time period of a simple harmonic oscillator is $T = 2\pi\sqrt{\frac{k}{m}}$. Measured value of mass (m) of the object is 10 g with an accuracy of 10 mg and time for 50 oscillations of the spring is found to be 60 s using a watch of 2 s resolution. Percentage error in determination of spring constant (k) is ____%.
- (A) 3.43 (B) 7.60
(C) 3.35 (D) 6.76
-
7. The speed of a longitudinal wave in a metallic bar is 400 m/s. If the density and Young's modulus of the bar material are increased by 0.5% and 1%, respectively then the speed of the wave is changed approximately to ____ m/s.
- (A) 398 (B) 402
(C) 401 (D) 399
-
8. In an experiment, a set of reading are obtained as follows - 1.24 mm, 1.25 mm, 1.23 mm, 1.21 mm. The expected least count of the instrument used in recording these readings is ____ mm.
- (A) 0.01 (B) 0.05
(C) 0.001 (D) 0.1
-
9. Four persons measure the length of a rod as 20.00 cm, 19.75 cm, 17.01 cm and 18.25 cm . The relative error in the measurement of average length of the rod is :
- (A) 0.18 (B) 0.24
(C) 0.06 (D) 0.08
-
10. To compare EMF of two cells using potentiometer the balancing lengths obtained are 200 cm and 150 cm . The least count of scale is 1 cm . The percentage error in the ratio of EMFs is ____
- (A) 1.75 (B) 1.55
(C) 1.17 (D) 1.65
-
11. If the percentage errors in measuring the length and the diameter of a wire are 0.1% each. The percentage error in measuring its resistance will be:
- (A) 0.144% (B) 0.2%
(C) 0.1% (D) 0.3%

12. In an experiment the values of two spring constants were measured as $k_1 = (10 \pm 0.2)\text{N/m}$ and $k_2 = (20 \pm 0.3)\text{N/m}$. If these springs are connected in parallel, then the percentage error in equivalent spring constant is : (21 Jan 2026 | Shift 1)

(A) 1.33% (B) 2.67%
(C) 1.67% (D) 2.33%

13. A spherical body of radius r and density σ falls freely through a viscous liquid having density ρ and viscosity η and attains a terminal velocity v_0 . Estimated maximum error in the quantity η is : (Ignore errors associated with σ , ρ and g , gravitational acceleration) (21 Jan 2026 | Shift 2)

(A) $2 \left[\frac{\Delta r}{r} - \frac{\Delta v_0}{v_0} \right]$ (B) $2 \left[\frac{\Delta r}{r} + \frac{\Delta v_0}{v_0} \right]$
(C) $\frac{2\Delta r}{r} + \frac{\Delta v_0}{v_0}$ (D) $2 \frac{\Delta r}{r} - \frac{\Delta v_0}{v_0}$

14. A quantity Q is formulated as $X^{-2}Y^{+\frac{3}{2}}Z^{-\frac{2}{5}}$. X , Y , and Z are independent parameters which have fractional errors of 0.1, 0.2, and 0.5, respectively in measurement. The maximum fractional error of Q is (8 Apr 2025 | Shift 2)

(A) 0.6 (B) 0.8
(C) 0.7 (D) 0.1

15. A physical quantity C is related to four other quantities p , q , r and s as follows

$$C = \frac{pq^2}{r^3\sqrt{s}}$$

The percentage errors in the measurement of p , q , r and s are 1%, 2%, 3% and 2%, respectively. The percentage error in the measurement of C will be _____%

(3 Apr 2025 | Shift 2)

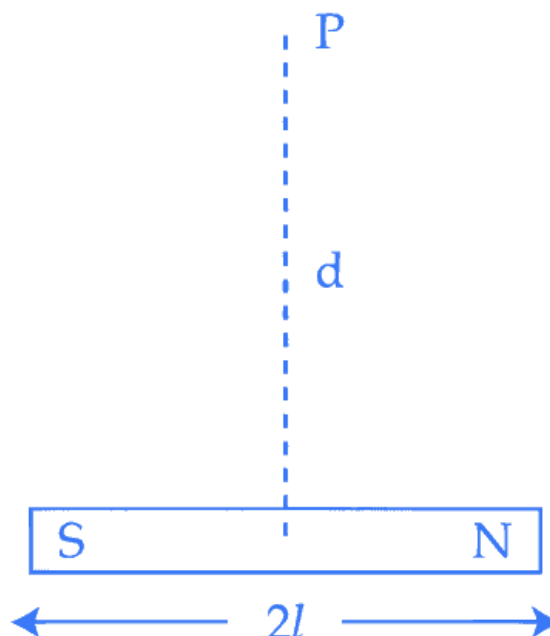
16. The energy of a system is given as $E(t) = \alpha^3 e^{-\beta t}$, where t is the time and $\beta = 0.3 \text{ s}^{-1}$. The errors in the measurement of α and t are 1.2% and 1.6%, respectively. At $t = 5 \text{ s}$, maximum percentage error in the energy is : (23 Jan 2025 | Shift 2)

(A) 6% (B) 11.6%
(C) 4% (D) 8.4%

17. A body of mass $(5 \pm 0.5) \text{ kg}$ is moving with a velocity of $(20 \pm 0.4) \text{ m/s}$. Its kinetic energy will be (13 Apr 2023 | Shift 1)

(A) $(1000 \pm 140) \text{ J}$ (B) $(500 \pm 0.14) \text{ J}$
(C) $(1000 \pm 0.14) \text{ J}$ (D) $(500 \pm 140) \text{ J}$

18.



A bar magnet has total length $2l = 20$ units and the field point P is at a distance $d = 10$ units from the centre of the magnet. If the relative uncertainty of length measurement is 1%, then uncertainty of the magnetic field at point P is : (28 Jan 2025 | Shift 2)

- | | |
|---------|--------|
| (A) 10% | (B) 5% |
| (C) 3% | (D) 4% |

19. The maximum percentage error in the measurement of density of a wire is

[Given, mass of wire = $(0.60 \pm 0.003)\text{g}$

radius of wire = $(0.50 \pm 0.01)\text{cm}$

length of wire = $(10.00 \pm 0.05)\text{cm}$]

(22 Jan 2025 | Shift 2)

- | | |
|-------|-------|
| (A) 7 | (B) 8 |
| (C) 5 | (D) 4 |

20. Young's modulus is determined by the equation given by $Y = 49000 \frac{M}{l} \frac{\text{dyne}}{\text{cm}^2}$ where M is the mass and l is the extension of wire used in the experiment. Now error in Young modulus (Y) is estimated by taking data from $M - l$ plot in graph paper. The smallest scale divisions are 5 g and 0.02 cm along load axis and extension axis respectively. If the value of M and l are 500 g and 2 cm respectively then percentage error of Y is :

(8 Apr 2024 | Shift 1)

- | | |
|----------|-----------|
| (A) 2% | (B) 0.02% |
| (C) 0.5% | (D) 0.2% |

21. To find the spring constant (k) of a spring experimentally, a student commits 2% positive error in the measurement of time and 1% negative error in measurement of mass. The percentage error in determining value of k is : (6 Apr 2024 | Shift 1)

(A) 5% (B) 3%
(C) 1% (D) 4%

22. In an experiment to measure focal length (f) of convex lens, the least counts of the measuring scales for the position of object (u) and for the position of image (v) are Δu and Δv , respectively. The error in the measurement of the focal length of the convex lens will be: (4 Apr 2024 | Shift 1)

(A) $2f \left[\frac{\Delta u}{u} + \frac{\Delta v}{v} \right]$ (B) $f \left[\frac{\Delta u}{u} + \frac{\Delta v}{v} \right]$
(C) $f^2 \left[\frac{\Delta u}{u^2} + \frac{\Delta v}{v^2} \right]$ (D) $\frac{\Delta u}{u} + \frac{\Delta v}{v}$

23. The radius (r), length (l) and resistance (R) of a metal wire was measured in the laboratory as

$$r = (0.35 \pm 0.05) \text{ cm}$$

$$R = (100 \pm 10) \text{ ohm}$$

$$l = (15 \pm 0.2) \text{ cm}$$

The percentage error in resistivity of the material of the wire is : (1 Feb 2024 | Shift 1)

(A) 37.3% (B) 25.6%
(C) 35.6% (D) 39.9%

24. The measured value of the length of a simple pendulum is 20 cm with 2 mm accuracy. The time for 50 oscillations was measured to be 40 seconds with 1 second resolution. From these measurements, the accuracy in the measurement of acceleration due to gravity is N%. The value of N is: (31 Jan 2024 | Shift 2)

(A) 6 (B) 5
(C) 4 (D) 8

25. The resistance $R = \frac{V}{I}$ where $V = (200 \pm 5)V$ and $I = (20 \pm 0.2)A$, the percentage error in the measurement of R is : (29 Jan 2024 | Shift 1)

(A) 5.5% (B) 3%
(C) 7% (D) 3.5%

26. A physical quantity Q is found to depend on quantities a, b, c by the relation $Q = \frac{a^4 b^3}{c^2}$. The percentage error in a, b and c are 3%, 4% and 5% respectively. Then, the percentage error in Q is : (29 Jan 2024 | Shift 2)

(A) 43% (B) 34%
(C) 66% (D) 14%

27. Given below are two statements: one is labelled as Assertion **A** and the other is labelled as Reason **R**

Assertion **A** : A spherical body of radius (5 ± 0.1) mm having a particular density is falling through a liquid of constant density. The percentage error in the calculation of its terminal velocity is 4%.

Reason **R** : The terminal velocity of the spherical body falling through the liquid is inversely proportional to its radius.

In the light of the above statements, choose the correct answer from the options given below (13 Apr 2023 | Shift 2)

(A) **A** is false but **R** is true (B) **A** is true but **R** is false
(C) Both **A** and **R** are true but **R** is NOT the correct explanation of **A** (D) Both **A** and **R** are true and **R** is the correct explanation of **A**

28. A physical quantity P is given as

$$P = \frac{a^2 b^3}{c \sqrt{d}}$$

The percentage error in the measurement of a, b, c and d are 1%, 2%, 3% and 4% respectively. The percentage error in the measurement of quantity P will be (10 Apr 2023 | Shift 1)

(A) 12% (B) 13%
(C) 16% (D) 14%

29. A cylindrical wire of mass (0.4 ± 0.01) g has length (8 ± 0.04) cm and radius (6 ± 0.03) mm. The maximum error in its density will be: (8 Apr 2023 | Shift 1)

(A) 1% (B) 5%
(C) 4% (D) 3.5%

30. A student in the laboratory measures thickness of a wire using screw gauge. The readings are 1.22 mm, 1.23 mm, 1.19 mm and 1.20 mm. The percentage error is $\frac{x}{121}\%$. The value of x is _____. (28 Jun 2022 | Shift 2)

31. Two resistances are given as $R_1 = (10 \pm 0.5)\Omega$ and $R_2 = (15 \pm 0.5)\Omega$. The percentage error in the measurement of equivalent resistance when they are connected in parallel is - (6 Apr 2023 | Shift 1)
- (A) 2.33 (B) 5.33
(C) 4.33 (D) 6.33
-
32. A 2 meter long scale with least count of 0.2 cm is used to measure the locations of objects on an optical bench. While measuring the focal length of a convex lens, the object pin and the convex lens are placed at 80 cm mark and 1 m mark, respectively. The image of the object pin on the other side of lens coincides with image pin that is kept at 180 cm mark. The % error in the estimation of focal length is: (6 Apr 2023 | Shift 2)
- (A) 1.70 (B) 0.51
(C) 1.02 (D) 0.85
-
33. In an experiment for estimating the value of focal length of converging mirror, image of an object placed at 40 cm from the pole of the mirror is formed at distance 120 cm from the pole of the mirror. These distances are measured with a modified scale in which there are 20 small divisions in 1 cm. The value of error in measurement of focal length of the mirror is $\frac{1}{K}$ cm. The value of K is _____. (30 Jan 2023 | Shift 1)
-
34. In an experiment of measuring the refractive index of a glass slab using travelling microscope in physics lab, a student measures real thickness of the glass slab as 5.25 mm and apparent thickness of the glass slab as 5.00 mm. Travelling microscope has 20 divisions in one cm on main scale and 20 divisions on vernier scale is equal to 49 divisions on main scale. The estimated uncertainty in the measurement of refractive index of the slab is $\frac{x}{10} \times 10^{-3}$, where x is _____. (29 Jan 2023 | Shift 2)
-
35. In an experiment to find acceleration due to gravity (g) using simple pendulum, time period of 0.5 s is measured from time of 100 oscillation with a watch of 1 s resolution. If measured value of length is 10 cm known to 1 mm accuracy, The accuracy in the determination of g is found to be $x\%$. The value of x is _____. (28 Jul 2022 | Shift 2)
-
36. For $z = a^2 x^3 y^{\frac{1}{2}}$, where 'a' is a constant. If percentage error in measurement of 'x' and 'y' are 4% and 12% respectively, then the percentage error for 'z' will be _____. (25 Jun 2022 | Shift 2)

37. A torque meter is calibrated to reference standards of mass, length and time each with 5% accuracy. After calibration, the measured torque with this torque meter will have net accuracy of : (27 Jul 2022 | Shift 1)
- (A) 15% (B) 25%
(C) 75% (D) 5%
-
38. In an experiment to determine the Young's modulus of wire of a length exactly 1 m, the extension in the length of the wire is measured as 0.4 mm with an uncertainty of ± 0.02 mm when a load of 1 kg is applied. The diameter of the wire is measured as 0.4 mm with an uncertainty of ± 0.01 mm. The error in the measurement of Young's modulus (ΔY) is found to be $x \times 10^{10} \text{ Nm}^{-2}$. The value of x is _____. (take $g = 10 \text{ ms}^{-2}$) (26 Jul 2022 | Shift 1)
-
39. The maximum error in the measurement of resistance, current and time for which current flows in an electrical circuit are 1%, 2% and 3% respectively. The maximum percentage error in the detection of the dissipated heat will be : (25 Jul 2022 | Shift 2)
- (A) 2 (B) 4
(C) 6 (D) 8
-
40. A silver wire has a mass (0.6 ± 0.006) g, radius (0.5 ± 0.005) mm and length (4 ± 0.04) cm. The maximum percentage error in the measurement of its density will be : (27 Jun 2022 | Shift 1)
- (A) 4% (B) 3%
(C) 6% (D) 7%
-
41. If $Z = \frac{A^2 B^3}{C^4}$, then the relative error in Z will be : (25 Jun 2022 | Shift 1)
- (A) $\frac{\Delta A}{A} + \frac{\Delta B}{B} + \frac{\Delta C}{C}$ (B) $\frac{2\Delta A}{A} + \frac{3\Delta B}{B} - \frac{4\Delta C}{C}$
(C) $\frac{2\Delta A}{A} + \frac{3\Delta B}{B} + \frac{4\Delta C}{C}$ (D) $\frac{\Delta A}{A} + \frac{\Delta B}{B} - \frac{\Delta C}{C}$
-
42. Two resistors $R_1 = (4 \pm 0.8) \Omega$ and $R_2 = (4 \pm 0.4) \Omega$ are connected in parallel. The equivalent resistance of their parallel combination will be : (1 Sept 2021 | Shift 2)
- (A) $(4 \pm 0.4) \Omega$ (B) $(2 \pm 0.4) \Omega$
(C) $(2 \pm 0.3) \Omega$ (D) $(4 \pm 0.3) \Omega$

43. A student determined Young's Modulus of elasticity using the formula $Y = \frac{MgL^3}{4bd^3\delta}$. The value of g is taken to be 9.8 m/s^2 , without any significant error, his observation are as following.

Physical Quantity	Least count of the Equipment used for measurement	Observed value
Mass (M)	1 g	2 kg
Length of bar (L)	1 mm	1 m
Breadth of bar (b)	0.1 mm	4 cm
Thickness of bar (d)	0.01 mm	0.4 cm
Depression (δ)	0.01 mm	5 mm

Then the fractional error in the measurement of Y is :

(1 Sept 2021 | Shift 2)

- (A) 0.0083 (B) 0.0155
(C) 0.155 (D) 0.083

44. The acceleration due to gravity is found upto an accuracy of 4% on a planet. The energy supplied to a simple pendulum to known mass 'm' to undertake oscillations of time period T is being estimated. If time period is measured to an accuracy of 3%, the accuracy to which E is known as%

(26 Aug 2021 | Shift 2)

45. A physical quantity 'y' is represented by the formula $y = m^2 r^{-4} g^x l^{-\frac{3}{2}}$

If the percentage errors found in y, m, r, l and g are 18, 1, 0.5, 4 and p respectively, then find the value of x and p.

(27 Jul 2021 | Shift 2)

- (A) 5 and ± 2 (B) 4 and ± 3
(C) $\frac{16}{3}$ and $\pm \frac{3}{2}$ (D) 8 and ± 2

46. In the experiment of Ohm's law, a potential difference of 5.0 V is applied across the end of a conductor of length 10.0 cm and diameter of 5.00 mm. The measured current in the conductor is 2.00 A. The maximum permissible percentage error in the resistivity of the conductor is :

(18 Mar 2021 | Shift 1)

- (A) 3.9 (B) 8.4
(C) 7.5 (D) 3.0

47. Three students S_1 , S_2 and S_3 perform an experiment for determining the acceleration due to gravity (g) using a simple pendulum. They use different lengths of pendulum and record time for different number of oscillations. The observations are as shown in the table.

Student No.	Length of Pendulum (cm)	No. of oscillations (n)	Total time for n oscillations	Time period (s)
1	64.0	8	128.0	16.0
2	64.0	4	64.0	16.0
3	20.0	4	36.0	9.0

(Least count of length = 0.1 cm and Least count for time = 0.1 s)

If E_1 , E_2 and E_3 are the percentage errors in ' g ' for students 1, 2 and 3 respectively, then the minimum percentage error is obtained by student no. _____.

(22 Jul 2021 | Shift 2)

48. The time period of a simple pendulum is given by $T = 2\pi\sqrt{\frac{l}{g}}$. The measured value of the length of pendulum is 10 cm known to a 1mm accuracy. The time for 200 oscillations of the pendulum is found to be 100 second using a clock of 1s resolution. The percentage accuracy in the determination of ' g ' using this pendulum is ' x '. The value of ' x ' to be nearest integer is :-

(18 Mar 2021 | Shift 1)

- (A) 2% (B) 3%
(C) 5% (D) 4%

49. The radius of a sphere is measured to be (7.50 ± 0.85) cm. Suppose the percentage error in its volume is x .

The value of x , to the nearest x , is _____.

(18 Mar 2021 | Shift 2)

50. The resistance $R = \frac{V}{I}$, where $V = (50 \pm 2)V$ and $I = (20 \pm 0.2)A$. The percentage error in R is ' x '. The value of ' x ' to the nearest integer is _____.

(16 Mar 2021 | Shift 1)

51. In order to determine the Young's Modulus of a wire of radius 0.2 cm (measured using a scale of least count = 0.001 cm) and length 1m (measured using a scale of least count = 1 mm), a weight of mass 1 kg (measured using a scale of least count = 1 g) was hanged to get the elongation of 0.5 cm (measured using a scale of least count 0.001 cm). What will be the fractional error in the value of Young's Modulus determined by this experiment? (16 Mar 2021 | Shift 2)
- (A) 0.14% (B) 9%
(C) 1.4% (D) 0.9%
-
52. The period of oscillation of a simple pendulum is $T = 2\pi\sqrt{\frac{L}{g}}$. Measured value of 'L' is 1.0 m from meter scale having a minimum division of 1 mm and time of one complete oscillation is 1.95 s measured from stopwatch of 0.01 s resolution. The percentage error in the determination of 'g' will be : (24 Feb 2021 | Shift 2)
- (A) 1.30% (B) 1.33%
(C) 1.13% (D) 1.03%
-
53. The density of a solid metal sphere is determined by measuring its mass and its diameter. The maximum error in the density of the sphere is $\left(\frac{x}{100}\right)\%$. If the relative errors in measuring the mass and the diameter are 6.0% and 1.5% respectively, the value of x is _____. (6 Sept 2020 | Shift 1)
-
54. A physical quantity z depends on four observables a, b, c and d, as $z = \frac{a^2 b^{\frac{2}{3}}}{\sqrt{cd^3}}$. The percentages of error in the measurement of a, b, c and d are 2%, 1.5%, 4% and 2.5% respectively. The percentage of error in z is : (5 Sept 2020 | Shift 1)
- (A) 13.5 % (B) 14.5%
(C) 16.5% (D) 12.25%
-
55. A simple pendulum is being used to determine the value of gravitational acceleration g at a certain place. The length of the pendulum is 25.0 cm and a stop watch with 1s resolution measures the time taken for 40 oscillations to be 50 s. The accuracy in g is : (8 Jan 2020 | Shift 2)
- (A) 4.40% (B) 3.40%
(C) 2.40% (D) 5.40%

56. In the density measurement of a cube, the mass and edge length are measured as (10.00 ± 0.10) kg and (0.10 ± 0.01) m, respectively. The error in the measurement of density is : (9 Apr 2019 | Shift 1)

(A) 0.01 kg/m^3 (B) 0.10 kg/m^3
(C) 0.31 kg/m^3 (D) 0.07 kg/m^3

57. In a simple pendulum experiment for determination of acceleration due to gravity (g), time taken for 20 oscillations is measured by using a watch of 1 second least count. The mean value of time taken comes out to be 30 s. The length of pendulum is measured by using a meter scale of least count 1 mm and the value obtained is 55.0 cm. The percentage error in the determination of g is close to :- (8 Apr 2019 | Shift 2)

(A) 0.2% (B) 3.5%
(C) 0.7% (D) 6.8%

58. The percentage errors in quantities P, Q, R and S are 0.5%, 1%, 3% and 1.5% respectively in the measurement of a physical quantity $A = \frac{P^3 Q^2}{\sqrt{RS}}$. The maximum percentage error in the value of A will be : (16 Apr 2018 | Shift 1)

(A) 6.0% (B) 7.5%
(C) 8.5% (D) 6.5%

59. The relative uncertainty in the period of a satellite orbiting around the earth is 10^{-2} . If the relative uncertainty in the radius of the orbit is negligible, the relative uncertainty in the mass of the earth is : (16 Apr 2018 | Shift 1)

(A) 10^{-2} (B) 2×10^{-2}
(C) 3×10^{-2} (D) 6×10^{-2}

60. The relative error in the determination of the surface area of sphere is α . Then the relative error in the determination of its volume is : (15 Apr 2018 | Shift 1)

(A) $\frac{3}{2}\alpha$ (B) $\frac{2}{3}\alpha$
(C) $\frac{5}{2}\alpha$ (D) α

61. The density of a material in the shape of a cube is determined by measuring three sides of the cube and its mass. If the relative errors in measuring the mass and length are respectively 1.5% and 1%, the maximum error in determining the density is:

(8 Apr 2018 | Single sitting)

- (A) 6% (B) 2.5%
(C) 3.5% (D) 4.5%

62. A physical quantity P is described by the relation

$$P = a^{1/2} b^2 c^3 d^{-4}$$

If the relative errors in the measurement of a, b, c and d respectively, are 2%, 1%, 3% and 5%, then the relative error in P will be :

(9 Apr 2017 | Shift 1)

- (A) 8% (B) 12%
(C) 32% (D) 25%

63. The following observations were taken for determining surface tension T of water by capillary method:

diameter of capillary, $D = 1.25 \times 10^{-2}$ m

rise of water, $h = 1.45 \times 10^{-2}$ m

Using $g = 9.80 \text{ m/s}^2$ and the simplified relation $T = \frac{r h g}{2} \times 10^3 \text{ N/m}$, the possible error in surface tension is closest to :

(2 Apr 2017 | Single sitting)

- (A) 10 % (B) 0.15 %
(C) 1.5 % (D) 2.4 %

64. A thin 1 m long rod has a radius of 5 mm. A force of $50 \pi \text{ kN}$ is applied at one end to determine its Young's modulus. Assume that the force is exactly known. If the least count in the measurement of all lengths is 0.01 mm, which of the following statements is false ?

(10 Apr 2016 | Shift 1)

- (A) $\frac{\Delta \gamma}{\gamma}$ gets minimum contribution from the uncertainty in the length. (B) The figure of merit is the largest for the length of the rod.
(C) The maximum value of γ that can be determined is $2 \times 10^{14} \text{ N/m}^2$ (D) $\frac{\Delta \gamma}{\gamma}$ gets its maximum contribution from the uncertainty in strain

65. A student measures the time period of 100 oscillations of a simple pendulum four times. The data set is 90 s, 91 s, 95 s and 92 s. If the minimum division in the measuring clock is 1 s, then the reported mean time should be : (3 Apr 2016 | Single sitting)
- (A) 92 ± 1.8 s (B) 92 ± 3 s
(C) 92 ± 2 s (D) 92 ± 5.0 s
-

66. The period of oscillation of a simple pendulum is $T = 2\pi\sqrt{\frac{L}{g}}$. Measured value of L is 20.0 cm known to 1 mm accuracy and time for 100 oscillations of the pendulum is found to be 90 s using wrist watch of 1 s resolution. The accuracy in the determination of g is: (4 Apr 2015 | Single sitting)
- (A) 1 % (B) 5 %
(C) 2 % (D) 3 %
-

67. An experiment is performed to obtain the value of acceleration due to gravity g by using a simple pendulum of length L. In this experiment time for 100 oscillations is measured by using a watch of 1 second least count and the value is 90.0 seconds. The length L is measured by using a meter scale of least count 1 mm and the value is 20.0 cm. The error in the determination of g would be (9 Apr 2014 | Single slot)
- (A) 4.4% (B) 2.27%
(C) 1.7% (D) 2.7%
-

68. The current voltage relation of diode is given by $I = (e^{100V/T} - 1) \text{ mA}$, where the applied voltage V is in volts and the temperature T is in degree kelvin. If a student makes an error measuring $\pm 0.01 \text{ V}$ while measuring the current of 5 mA at 300 K, what will be the error in the value of current on mA? (6 Apr 2014 | Single sitting)
- (A) 0.2 mA (B) 0.02 mA
(C) 0.5 mA (D) 0.05 mA
-

69. The amount of heat produced in an electric circuit depends upon the current (I), resistance (R) and time (t). If the error made in the measurements of the above quantities are 2%, 1% and 1% respectively then the maximum possible error in the total heat produced will be (19 May 2012 | Single slot)
- (A) 1% (B) 2%
(C) 6% (D) 3%
-

70. Resistance of a given wire is obtained by measuring the current flowing in it and the voltage difference applied across it. If the percentage errors in the measurement of the current and the voltage difference are 3% each, then error in the value of resistance of the wire is
- (A) 6 % (B) zero
(C) 1 % (D) 3 %
- (29 Apr 2012 | Single sitting)