



# PHYSICS

# **BOOKS - DISHA PHYSICS (HINGLISH)**

# ERROR MEASUREMENTS

# Physics

1. A wire has a mass  $0.3 \pm 0.003g$ , radius  $0.5 \pm 0.005mm$  and length  $6 \pm 0.06cm$ . The maximum percentage error in the measurement of its density is

A. 1

B. 2

C. 3

D. 4

Answer:

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**2.** If 97.52 is divided by 2.54, the correct result in terms of significant figures is

A. 38.4

B. 38.3937

C. 38.394

D. 38.39

**3.** A physical quantity A is related to four observable a,b,c and d as follows,  $A = \frac{a^2b^3}{c\sqrt{d}}$ , the percentage errors of measurement is a,b,c and d,are 1%, 3%, 2% and 2% respectively. What is the percentage error in the quantity A?

A. 0.12

B. 0.07

C. 0.05

D. 0.14



**4.** A physical quantity X is represented by  $X = (M^x L^{-y} T^{-z})$ . The maximum percantage errors in the measurement of M, L, and T, respectively, are a %, b % and c %. The maximum percentage error in the measurement of X will be

A. 
$$alpha+oldsymbol{\eta}+c\gamma$$

B. 
$$alpha+oldsymbol{\eta}-c\gamma$$

$$\mathsf{C}.\,\frac{a}{\alpha} + \frac{b}{\beta} + \frac{C}{\gamma}$$

D. None of these

#### Answer:



5. If the length of rod A is 3.25  $\pm$  0.01 cm and that of B is 4.19

 $\pm~$  0.01 cm then the rod B is longer than rod A by

A. 0.94  $\,\pm\,$  0.00 cm

B. 0.94  $\pm$  0.01 cm

C. 0.94  $\pm$  0.02 cm

D. 0.94  $\pm$  0.05 cm

**Answer:** 

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**6.** If L=2.331cm,B=2.1cm, then `L+B=

A. 4.431 cm

B. 4.43 cm

C. 4.4 cm

D. 4 cm

# Answer:

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7. The number of significant figures in all the given numbers 25.12, 2009, 4.156 and  $1.217 imes 10^{-4}$  is

A. 1

B. 2

C. 3

D. 4

#### Answer:

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8. In an experiment , the following observations were recorded:

L=2.820m, M=3.00kg, l=0.087cm, diameter, D=0.041cm. Taking  $g=9.81ms^{-2}$  and using the formula ,  $Y=rac{4MgL}{\pi D^2 l}$  , find the maximum permissible error in Y.

A. 0.0796

B. 0.0456

C. 0.065

D. 0.0842



**9.** A physical parameter a can be determined by measuring the parameters b, c, d, and e using the relation  $a = b^{\alpha}c^{\beta}/d^{\gamma}e^{\delta}$ . If the maximum errors in the measurement of b, c, d, and  $eareb_1 \%$ ,  $c_1 \%$ ,  $d_1 \%$ , and  $e_1 \%$ , then the maximum error in the value of a determined by the experminent.

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.  $(\alpha b_1 + \beta C_1 + \gamma d_1 + \delta e_1)$  %

#### Answer:

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10. The period of oscillation of a simple pendulum is given by

 $T=2\pi\sqrt{rac{l}{g}}$  where I is about 100 cm and is known to have 1

mm accuracy. The period is about 2 s. The time of 100 oscillation is measrued by a stop watch of least count 0.1 s. The percentage error is g is

A. 0.0012

B. 0.01

C. 0.002

D. 0.008



**11.** The mean time period of second's pendulum is 2.00 s and mean absolute error in the time period is 0.05s. To express maximum estimate of error, the time period should be written

as

A. (2.00  $\pm$  0.01)s

B. (2.00  $\pm$  0.025)s

C. (2.00  $\pm$  0.05)s

D. (2.00  $\pm$  0.10)s



12. Errror in the measurement of radius of a sphere is  $1\,\%\,$  .The

error in the calculated value of its volume is

A. 0.01

B. 0.03

C. 0.05

D. 0.07

Answer:

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13. The relative density of material of a body is found by weighting it first in air and then in water . If the weight in air is  $(5.00 \pm 0.05)N$  and the weight in water is  $(4.00 \pm 0.05)N$ . Find the relative density along with the maximum permissible percentage error.

A. 5.0  $\pm$  11%

B. 56.0  $\pm$  1%

C. 5.0  $\pm$  6%

D. 1.25  $\pm$  5%

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#### Answer:



A. 0.05

B. 0.07

C. 0.052

D. 5/2%

Answer:



**15.** The length of a cylinder is measured with a meter rod having least count 0.1cm. Its diameter is measured with Vernier calipers having least count 0.01cm. Given that length is 5.0cm and radius is 2cm. Find the percentage error in the calculated value of the volume.

A. 0.01

B. 0.02

C. 0.03

D. 0.04

Answer:

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**16.** According to Joule's law of heating , heat produced  $H = I^2 R t$ , where I is current , R is resistance of I , R , and tare 3 % , 4 % , and 6 % , respectively , find error in the measurement of H.

A.  $\pm$  17%

B.  $\pm$  16%

C.  $\pm$  19%

D.  $\pm$  25%

# Answer:

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**17.** A physical quantity *P* is given by  $P = \frac{A^3 B^{1/2}}{C^{-4} D^{3/2}}$ . Which quantity among *A*, *B*, *C*, and *D* brings in the maximum percentage error in *P*?

A. A

B. B

C. C^(2)m^(2)N^(-2)

D. D

Answer:

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**18.** If there is a positive error of 50% in the measurement of velocity of a body , find the error in the measurement of kinetic energy.

A. 0.25

B. 0.5

C. 1

D. 1.25

### Answer:



**19.** The random error in the arithmetic mean of 100 observations is x, then random error in the arithmetic mean of

# 400 observations would be

A. 4x

 $\mathsf{B}.\,\frac{1}{4}x$ 

D. 
$$\frac{1}{2}x$$

#### Answer:



**20.** The percentage errors in the measurement of mass and speed are 2% and 3%, respectively. How much will be the maximum error in the estimation of KE obtained by measuring mass and speed?

B. 0.08

C. 0.05

D. 0.01

Answer:



21. The unit of percentage error is

A. (a) Same as that of physical quantity

B. (b) Different from that of physical quantity

C. (c) Percentage error is unitless

D. (d) Errors have got their own units which are different

from that of physical quantity measured

### Answer:

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22. In the context of accuracy of measurement and significant figures in expressing result of experiment, which of the following is /are correct
(1) Out of the two measurements 50.14 cm and 0.00025 ampere, the first one has greater accuracy
(2) If one travels 478 km by rail and 397 m by road, the total distance travelled is 478 km

A. 1. Out of the two measurements 50.14 cm and 0.00025 ampere, the first one has greater accuracy

B. 2. Out of the two measurements 50.14 cm and 0.00025

ampere, the second has greater accuracy.

C. 3. If one travels 478 km by rail and 397 m by road, the

total distance travelled is 875 km.

D. 4. If one travels 697 m by rail and 478 km by road, the

total distance is 478 km.

#### Answer:



**23.** A body travels uniformly a distance of  $(13.8 \pm 0.2)m$  in a time  $(4.0 \pm 0.3)s$ . Find the velocity of the body within error limits and the percentage error.

A. 1. Its velocity with error limit is (3.5 0.31)  $\pm$  ms–1

B. 2. Its velocity with error limit is (3.5 0.11)  $\pm$  ms–1

C. 3. Percentage error in velocity is 4%

D. 4. Percentage error in velocity is 9%

#### Answer:

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**24.** A tuning fork vibrating with a frequency of 512 Hz is kept close to the open end of a tube filled with water , figure. The water level in the tube is gradually lowerd. When the water level is 17cm below the open end, maximum intensity of sound in heard. If the room temperature is  $20^{\circ}C$ , calculate

(a) speed of sound in air at room temperature.

(b) speed of sound in air at  $0\,^\circ\, C$ 

(c) if the water in the tube is replaced with mercury, will there

# be any difference in your observations?



A. 275 m/s

B. 376 m/s

C. 356 m/s

D. 330  $m\,/\,s$ 

25. In the experiment for the determination of the speed of sound in air using the resonance column method, the length of the air column that resonates in the fundamental mode, with a tuning fork is 0.1m. When this length is changed to 0.35m, the same tuning fork resonates with the first overtone. Calculate the end correction.

A. 0.2 cm

B. 0.3

C. 0.1 cm

D. 0.4 cm

**26.** Assertion : Number of significant figure in 0.005 is one and

that is 0.500 is three

Reason : This is became zeros are not significant

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27. Assersion : Out of three meansurements l = 0.7m, l = 0.70m and l = 0.700m the last one is most accurate.

Reason: In every meansurements only the last significant digit is not accurately known.



28. Assertion : Parallax method cannot be used for measuring

distance of stars morer then 100 light year away.

Reason : Because parallax angle reduces so much that it cannot

be measured accurately.

