PHYSICS

RESONANCE ENGLISH

UNITS, DIMENSION & MEASUREMENT

Exercise

1. Which of the following sets cannot enter into the list of fundamental quantities in any system of units?

A. length,mass and velocity

B. length,time and velocity

C. mass, time and velocity

D. length, time and mass

Answer: B

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2. A dimensionless quantity

A. never has a unit

B. always has a unit

C. may have a unit

D. does not exit

Answer: C

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3. A unit less qunatity

A. never has a nonzero dimension

B. always has nonzero dimension

C. may have a nonzero dimension

D. does not exit

Answer: A

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4. Of the following quantities , which one has the dimensions different from the remaining three?

A. Impulse and linear momentum

B. Plank's constant and angular momentum

C. moment of inertia and moment of force

D. Young's modulus and pressure

Answer: C

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5. Which of the following sets have different dimensions?

A. Pressure, Young's modulus, Stress

B. Emf, potential difference, Electric potential

C. Heat,work done, energy

D. Dipole moment, Electric flux,Electric field

Answer: D

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6. The dimensional formula for latent heat is

A. $\left[M^0L^2T^{-2}\right]$

B. $\left[ML^2T^{-2}\right]$

C. $\left[MLT^{-2}\right]$

D. $\left[ML^2T^{-1}\right]$

Answer: A

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7. The young's modulus of a material of wire is $12.6 \times 10^{11} \text{dyne}/cm^2$. Its value is SI system is

A. $12.6 \times 10^{12} N/m^2$

B. $12.6 \times 10^{10} N/m^2$

C. $12.6 \times 10^{6} N/m^2$

D. $12.6 \times 10^{8} N/m^2$

Answer: B

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8. A watt is

A. kgm/s^2

B. kgm^2/s^3

C. kgm/s

D. kgm^2/s^2

Answer: B

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9. Assertion : Kilowatt hour is the unit of power.

Reason: One kilowatt hour is equivalent to 3.6×10^5 J

A. Power

B. Energy/time

C. work

D. Power/ time

Answer: C

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10. The dimension of Planck constant equals to that of :

A. angular momentum

B. linear momentum

C. force

D. energy

Answer: A

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11. Unit of surface tension is

A. N/m^2

B. J/s

C. Ns/m

D. N/m

Answer: D

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12. If unit of length and time is double, dthe numerical valuure of $'g'$ (acceleration due to gravity) will be

A. doubled

B. Triple

C. Half

D. one fourth

Answer: A

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13. Which of the options has two quantities that have different dimensions ?

A. momentum and impulse

B. light year and time

C. energy and torque

D. none of the these

Answer: B

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14. If we use permitivity ε, resistance R, gravitational constant G and voltage V as fundamental physical quantities, then:

A. [angular displacement]=$\varepsilon^1 R^0 G^0 V^0$

B. [velocity] $= \varepsilon^{-1} R^{-1} G^0 V^0$

C. [dipole moment] =$\varepsilon^1 R^0 G^0 V^{-1}$

D. [force]=$\varepsilon^2 R^0 G^0 V^2$

Answer: B

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15. You may not know integration , but using dimensional analysis you can check on some results . In the integral

$$\int \frac{dx}{(2ax - x^2)^{1/2}} = a^n \sin^{-1}\left(\frac{x}{a} - 1\right),$$ find the valiue of n .

A. 1

B. 2

C. $1/2$

D. 3

Answer: A

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16. The length of a rectangular plate is measured by a meter scale and is found to be $10.0cm$. Its width is measured by verier callipers as $1.00cm$. The least count of the meter scale and vernier callipers are $0.1cm$ and $0.01cm$ respectively. Maximum permissible error in area measurement is

A. $\pm 0.2cm^2$

B. $\pm 0.1cm^2$

C. $\pm 0.3cm^2$

D. zero

Answer: A

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17. In the previous question, minimum possible error in area measurement can be.

A. $\pm 0.02 cm^2$

B. $\pm 0.01 cm^2$

C. $\pm 0.03 cm^2$

D. zero

Answer: A

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18. To estimate g (from $g = 4\pi^2 \frac{L}{T^2}$), error in measurement of L is $\pm 2\%$ and error in measurement of $Tis \pm 3\%$ The error in estimated g will be

A. $\pm 8\%$

B. $\pm 6\,\%$

C. $\pm 3\,\%$

D. $\pm 5\,\%$

Answer: A

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19. An experiment measure quantities x,y,z and then t is in calculate from the data as $t = \frac{xy^2}{z^2}$ if perecentage error in x,y,z and are

respectively $1\%, 3\%, 2\%$ then percentage error in//is

A. 10%

B. 4%

C. 7%

D. 13%

Answer: D

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20. The external and internal diameters of a hollow cylinder are measured to be (4.23 ± 0.01) cm and (3.89 ± 0.01)cm. The thickness of the wall of the cylinder is

A. $(0.34 \pm 0.02)cm$

B. $(0.17 \pm 0.02)cm$

C. $(0.17 \pm 0.02)cm$

D. $(0.34 \pm 0.01)cm$

Answer: C

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21. The mass of a ball is 1.76kg. The mass of 25 such balls is

A. $0.44 \times 10^3 kg$

B. $44.0kg$

C. $44kg$

D. $44.00kg$

Answer: B

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22. A cube has a side length $1.2 \times 10^{-2} m$ .Calculate its volume

A. $1.72 \times 10^{-6} m^3$

B. $1.78 \times 10^{-4} m^3$

C. $1.7 \times 10^{-6} m^3$

D. $1.73 \times 10^{-9} m^3$

Answer: C

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23. A student performs an experiment for determination of $g\left(=\frac{4\pi^2 l}{T^2}\right)$, $\approx 1m$, and he commits an error of Δl.

For T he takes the time of n oscillations with the stop watch of least count Δ and he commits is human error of $0.1\,\text{sec}$. For which of the following data, the measurement of g will be most accurate?

A. $\Delta L = 0.5, \Delta T = 0.1, n = 20$

B. $\Delta L = 0.5, \Delta T = 0.1, n = 50$

C. $\Delta L = 0.5, \Delta T = 0.01, n = 20$

D. $\Delta L = 0.5, \Delta T = 0.05, n = 50$

Answer: D

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24. The respective number of significant figures for the numbers $23.023, 0.0003$ and 2.1×10^{-3} are

A. $5, 1, 2$

B. $5, 1, 5$

C. $5, 5, 2$

D. $4, 4, 2$

Answer: A

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25. The readings of a constant potential difference is noted four times by a student. The student averages these readings but does not take into account the zero error of the

voltmeter. The average measurement of the

$$\begin{vmatrix} \text{Reading } 1 & 1.176V \\ \text{Reading } 2 & 1.178V \\ \text{Reading } 3 & 1.177V \\ \text{Reading } 4 & 1.176V \end{vmatrix}$$

A. precise and accurate

B. precise but not accurate

C. accurate but not precise

D. not accurate and not precise

Answer: B

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26. If a tunnig fork of frequency $(f_0)340Hz$ and tolerance $\pm 1\,\%$ is used in resonance coulmn method $[v = 2f_0(l_2 - l_1)]$, the first and the second resonance are measured at $l_1 = 24.0cm$ and $l_2 = 74.0cm$. Find max. permissible error in speed of sound.

A. $1\,\%$

B. $1.2\,\%$

C. $1.4\,\%$

D. $1.6\,\%$

Answer: C

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27. The volume of a sphere is given by

$$V = \frac{4}{3}\pi R^3$$

where R is the radius of the radius of the sphere. Find the change in volume of the sphere as the radius is increased from $10.0cm$ to $10.1cm$. Assume that the rate does not appreciably change between $R = 10.0cm$ to $R = 10.1cm$

A. $10\pi cm^3$

B. $20\pi cm^3$

C. $30\pi cm^3$

D. $40\pi cm^3$

Answer: D

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