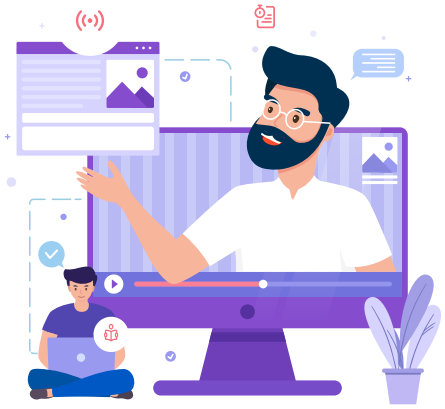
Question

If L and R denote inductance and resistance, respectively, then the dimension of L / R is given by:

1. $M^0L^0T^0$
2. M^0L^0T
3. MLT^0
4. ML^0T

Answer (Detailed Solution Below)

Option 2 : M^0L^0T



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Detailed Solution Download Solution PDF

Concept:

- **Measurement of any physical quantity** involves comparison with a certain basic, arbitrarily chosen, internationally accepted reference standard called unit, and a Dimension is a mathematical tool used for studying the nature of physical quantities.
- The basic concept of dimensions is that we can **add or subtract** only those quantities which have the same dimensions.
- And the dimensional formula is defined as the expression of the physical quantity in terms of **mass, length, and time.**

Inductance:

- The **tendency of any conductor** which **opposes** the **change in the electric current flowing through it** is called as **inductance** of that conductor.
- The SI unit **of inductance is Henry**.
- The Dimension of Inductance is $[M^1 L^2 T^{-2} A^{-2}]$

The inductance of a coil of wire is given by,

$$L = \frac{\mu_0 N^2 A}{L}$$

Where N is the number of turns

A is the cross-sectional area

L is the length of the solenoid.

μ_0 is the permeability of the free space

Resistance:

- The property by which an electric conductor opposes the flow of current through it is called as **resistance** of the conductor.
- It is denoted by R.
- The **SI unit of resistance is Ohm (Ω).**

$$Resistance\ (R) = \rho \frac{l}{A}$$

Where ρ is the resistivity of a conductor, l is the length of conductor and A is the cross-sectional area.

Dimension for resistance (R) = $[M^1 L^2 T^{-3} A^{-2}]$

Calculation:

Dimension of R = $[M^1 L^2 T^{-3} A^{-2}]$

Then the Ratio of both –

$$\frac{L}{R} = \frac{[M^1L^2T^{-2}A^{-2}]}{[M^1L^2T^{-3}A^{-2}]} = [M^0L^0T^1A^0]$$

Hence the **correct option in terms of M, L & T is $[M^0 L^0 T]$**

Latest DSSSB PRT Updates

Last updated on Mar 31, 2023

The Delhi Subordinate Services Selection Board (DSSSB) had released the final result and cut-off marks for the DSSSB PRT. The result and marks has been released for the post code - 42/21. A total of 434 candidates have been selected for the post of Assistant Teacher (Primary) in the Directorate of Education. Check out the DSSSB PRT Result here. Candidates who will be finally

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More Dimensional formulae and dimensional equations Questions

Q1. LT-2 is the dimension of which of the following quantities?

Q3. An expression for a dimensionless quantity P is given by $P = \frac{\alpha}{\beta}\log_e\left(\frac{\beta x}{kt}\right)$, where α and β are constants, x is distance; k is the Boltzmann constant and t is the temperature. Then the dimensions of α will be :

Q4. What are the dimensions of gravitational potential?

Q5. Match List - I with List - II: List - I List - II (a) Gravitational constant (G) (i) [L2T-2] (b) Gravitational potential energy (ii) [M-1L3T-2] (c) Gravitational potential (iii) [LT-2] (d) Gravitational intensity (iv) [ML2T-2] Choose the correct answer from the options given below:

Q6. The dimensions [MLT-2 A-2] belong to the:

Q7. Match List - I with List - II : List - I List - II (a) h (Planck's constant) (i) [MLT-1] (b) E (kinetic energy) (ii) [ML2T-1] (c) V (electric potential) (iii) [ML2T-2] (d) P (linear momentum) (iv) [ML2I-1T-3] Choose the correct answer from the options given below :

Q8. If e is the electronic charge, c is the speed of light in free space and h is Planck's constant, the quantity $\frac{1}{4\pi\varepsilon_0}\frac{|e|^2}{\hbar c}$ has dimensions of:

Q9. The work done by a gas molecule in an isolated system is given by, $W = \alpha\beta^2 e^{-\frac{x^2}{\alpha kT}}$, where x is the displacement, k is the Boltzmann constant and T is the temperature. α and β are constants. Then the dimensions of β will be:

Q10. If force [F], acceleration [A] and time [T] are chosen as the fundamental physical quantities. Find the dimensions of energy.

More Units, Dimensions and Measurements Questions

Q1. The Unit of noise pollution (level) is -

Q2. The dimension of Plank's constant is _____.

Q3. A cube has a side of length 1.1 × 10-2 m. Its volume is:

Q4. The density of a cube is found out by measuring its mass and length of its sides. If the maximum errors in the measurement of mass and length are 3% and 2% respectively, the maximum error in the measurement of density will be :

Q5. Length cannot be measured in:

Q6. The respective number of significant figures for the numbers 28.028, 0.0004 and 1.2 × 10-3 are:

Q7. Consider the following units : A. kilowatt hour B. joule C. newton metre D. pascal metre2 The units of energy are

Q10. What is the SI unit of force?

More Physics Questions

Q1. The force between two parallel current carrying conductors placed at a x distance apart and carrying current I is:

Q2. The lens formula in Cartesian coordinate system is - where, u = object distance from optical center v = image distance from optical center f = focus distance from optical center

Q3. Geo-stationary satellite revolves at

Q4. Which colour of light deviates maximum in the dispersion of white light by prism?

Q5. The Unit of noise pollution (level) is -

Q6. CRYOGENICS is _____

Q7. Living/dining places of railway coaches are called

Q8. The best conductor of heat among the following is _____

Q9. For total internal reflection, ray of light has to pass through-

Q10. The intensity of the earth's gravitational field is maximum at:

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