ASSIGNMENT- 2

Units and Measurements

Part - I

Given below are four options against each question. Choose the option which you consider the most appropriate as your answer. 1.Which of the following represents correct dimensions of the coefficient of viscosity?

(A) $[M^1 L^{-1} T^{-2}]$ (B) $[M^1 L^{-1} T^{-1}]$
(C) $[M^1 L^1 T^{-1}]$ (D) $[M^1 L^{-2} T^{-2}]$

2.The dimensional equation for the electrical resistance of a conductor is

(A) $[M^1 L^2 T^2 I^{-1}]$ (B) $[M^1 L^2 T^{-2} I^{-1}]$ (C) $[M^1 L^1 T^{-3} I^{-2}]$ (D) $[M^1 L^2 T^{-3} I^{-2}]$

3. The fundamental physical quantities that have same dimensions in the dimensional formulae of torque and angular momentum are

(A) mass, time   (B) time, length
(C) mass, length   (D) time, mole

4. For the equation $F \propto A^a v^b d^c$, where F is the force, A is the area, v is the velocity and d is the density, the values of a, b and c are respectively

(A) 1, 2, 1   (B) 2, 1, 1
(C) 1, 1, 2 ε(D) 0, 1, 1

5.The sides of a rectangle are 6.01 m and 12 m. Taking the significant figures into account, the area of the rectangle is

(A) 72.00 cm^2 (B) 72.1 cm^2
(C) 72 m^2 (D) 72.12 cm^2

6. Let $[\varepsilon_0]$ denote the dimensional formula of the permittivity of vacuum. If M = mass, L = length, T = time and A = electric current, then

(A) $[\varepsilon_0] = [M^{-1} L^{-3} T^2 A]$

(B) $[\varepsilon_0] = [M^{-1} L^{-3} T^4 A^2]$

(C) $[\varepsilon_0] = [M^{-1} L^2 T^{-1} A^{-2}]$

(D) $[\varepsilon_0] = [M^{-1} L^2 T^{-1} A]$

7.The dimension of $1/2 \varepsilon_0 E^2$, where ε_0 IS permittivity of free space and E is electric field, is

(A) $[L^{-2} M^1 T^2]$ (B) $[L^1 M^1 T^{-2}]$
(C) $[L^2 M^1 T^2]$ (D) $[L^1 M^1 T^1]$

8. The dimensional formula of magnetic flux is

_____.
(A) $[M^1L^2T^{-3}A^{-1}]$ (B) $[M^1L^2T^{-2}A^{-1}]$
(C) $[M^{-1}L^{-2}T^2A^1]$ (D) $[M^1L^3T^{-2}A^{-1}]$

9. The number of significant figures in 0.002305 is
(A) 6   (B) 4
(C) 7   (D) 2

10. Choose the INCORRECT statement out of the following.

(A) Every measurement by any measuring instrument has some error.
(B) Every calculated physical quantity that is based on measured values has some error.
(C) A measurement can have more accuracy but less precision and vice versa.
(D) The percentage error is different from relative error.

Part - II

1. If $X = a + bt + ct^2$, where X is in metre and t in second, then what is the unit of c?
2. Distinguish between accuracy and precision.
3. Define principle of homogeneity.
4. Which type of error can not be removed and why ?
5. Define scalar and vector quantities giving their examples.
6. . The time period of a simple pendulum depends on its mass, length and acceleration due to gravity. Find the expression of time period using the method of dimensions.
7. What do you mean by error? Define its different types also.
8. Joule is the SI unit of work and erg is its CGS unit. Find the relation between them using the method of dimensions.
9. What do you mean by significant figures? How significant figures are determined in case of sum and multiplication of two physical quantities ? Explain with examples.
10. Define dimensions of a physical quantity. Explain the limitations of dimensional analysis.

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