

DPP No. : 1**(Unit & Dimension, Measurement Error)**

SR. No.	DPPs Qs. Details		Marking Scheme				Time Details		
	Type of Questions	Code	Full Marks	(-ve Marks	Total Ques.	Total Marks	Qs (in Min.) for Each Qs	Time (in Min.)	Max. Time (in Min.)
1	MULTIPLE CHOICE QUESTION (ONLY ONE CORRECT OPTION)	MCQ	4	-1	10	40	1	10	
	Total				10	40			10

- Number of particles is given by $n = -D \frac{n_2 - n_1}{x_2 - x_1}$ crossing a unit area perpendicular to X-axis in unit time, where n_1 and n_2 are number of particles per unit volume for the value of x meant to x_2 and x_1 . Find dimensions of D called as diffusion constant :
 (1) $M^0L^2T^{-2}$ (2) $M^0L^2T^{-4}$ (3) M^0LT^{-3} (4) $M^0L^2T^{-3}$
- Which of the following sets cannot enter into the list of fundamental quantities in any system of units?
 (1) length, mass and velocity (2) length, time and velocity
 (3) mass, time and velocity (4) length, time and mass
- Which pair of following quantities has dimensions different from each other.
 (1) Impulse and linear momentum (2) Planck's constant and angular momentum
 (3) Moment of inertia and moment of force (4) Young's modulus and pressure
- The dimensional formula for latent heat is : (latent heat is heat per unit mass)
 (1) $[M^0L^2T^{-2}]$ (2) $[ML^2T^{-2}]$ (3) $[MLT^{-2}]$ (4) $[ML^2T^{-1}]$
- The modulus of elasticity is dimensionally equivalent to :
 (1) acceleration (2) surface tension (3) stress (4) strain
- S. I. Unit of surface tension is :
 (1) N/m^2 (2) J/s (3) Ns/m (4) N/m
- A particle of mass m is suspended by a spring if frequency of its oscillation is $n = cm^xk^y$ here c is a constant then the value of x and y are -
 (1) $x = \frac{1}{2}, y = \frac{1}{2}$ (2) $x = -\frac{1}{2}, y = -\frac{1}{2}$
 (3) $x = -\frac{1}{2}, y = \frac{1}{2}$ (4) $x = \frac{1}{2}, y = -\frac{1}{2}$
- If pressure P , velocity V and time T are taken as fundamental physical quantities, the dimensional formula of the force is-
 (1) PV^2T^2 (2) $P^{-1}V^2T^{-2}$ (3) PVT^2 (4) $P^{-1}VT^2$
- The length of a rectangular plate is measured by a meter scale and is found to be 10.0 cm. Its width is measured by vernier callipers as 1.00 cm. The least count of the meter scale and vernier callipers are 0.1 cm and 0.01 cm respectively (Obviously). Maximum permissible error in area measurement is -
 (1) $\pm 0.2 \text{ cm}^2$ (2) $\pm 0.1 \text{ cm}^2$ (3) $\pm 0.3 \text{ cm}^2$ (4) Zero

10. 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 T is $\pm 3\%$. The error in estimated 'g' will be -
 (1) $\pm 8\%$ (2) $\pm 6\%$ (3) $\pm 3\%$ (4) $\pm 5\%$
11. An experiment measures quantities x, y, z and then t is calculated from the data as $t = \frac{xy^2}{z^3}$. If percentage errors in x, y and z are respectively 1%, 3%, 2%, then percentage error in t is :
 (1) 10 % (2) 4 % (3) 7 % (4) 13 %
12. The thickness of a glass plate is measured to be 3.81 mm, 3.80 mm and 3.81 mm at three different places. Find the average thickness of the plate from this data.
 (1) 3.80 (2) 3.806 (3) 3.8 (4) 3.81
13. What is the maximum percentage error in density of a body if percent error in measurement of mass is 4% and percent error in measurement of side is 5% -
 (1) 18% (2) 19% (3) 20% (4) 21%
14. The percentage error in measurement of length and time period is 2% and 1% respectively. The percentage error in measurement of 'g' is -
 (1) 2% (2) 4% (3) 6% (4) 8%
15. In an experiment four quantities a, b, c and d are measured with percentage error 1%, 2%, 3% and 4% respectively. Quantity P is calculated as follows :

$$P = \frac{a^3b^2}{cd}$$
 % error in P is :
 (1) 10% (2) 7% (3) 4% (4) 14%
16. Taking into account the significant figures what is the value of 9.99 m – 0.0099 m ?
 (1) 9.98 m (2) 9.980 m (3) 9.9 m (4) 9.9801 m
17. The percentage error in the measurement of g is :
 (Given that $g = \frac{4\pi^2L}{T^2}$, L = (10 \pm 0.1) cm, T = (100 \pm 1) s)
 (1) 2% (2) 5% (3) 3% (4) 7%
18. When the circular scale of a screw gauge completes 2 rotations, it covers 1 mm over the pitch scale. The total number of the circular scale divisions is 50. The least count of the screw gauge in metre is :
 (1) 10^{-5} (2) 10^{-2} (3) 10^{-3} (4) 10^{-4}
19. In C.G.S. system the magnitude of the force is 100 dynes. In another system where the fundamental physical quantities are kilogram, meter and minute, the magnitude of the force is -
 (1) 0.036 (2) 0.36 (3) 3.6 (4) 36

20. Which relation is wrong

(1) 1 Calore = 4.18 Joules

(2) $1\text{\AA} = 10^{-10}\text{ m}$

(3) $1\text{MeV} = 1.6 \times 10^{-13}\text{ Joules}$

(4) 1 Newton = 10^{-5} Dynes

DPP No. : 1 (Mathmatical Tools) Answer key

1. (4) 2. (1) 3. (2) 4. (4) 5. (2) 6. (2) 7. (2)
8. (4) 9. (1) 10. (1)