PHYSICS TEST

(UNITS AND MEASUREMENTS)

Time: 90min Total marks: 25 marks

1. Plane angle and solid angle have:

(a) Dimension but no units
(b) No units and no dimensions
(c) Both units and dimensions
(d) Units but no dimensions

2. If E and G respectively denote energy and gravitational constant, then E/G has the dimensions of

(a) $[M^2]\ [L^{-2}]\ [T^{-2}]$
(b) $[M^2]\ [L^{-1}]\ [T^0]$
(c) $[M]\ [L^{-1}]\ [T^{-1}]$
(d) $[M]\ [L^0]\ [T^0]$

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

(a) $[F][A^{-1}][T]$
(b) $[F][A][T]$
(c) $[F][A]T^2]$
(d) $[F][A][T^{-1}]$

4. Dimensions of stress are:

(a) $[ML^2T^{-2}]$
(b) $[ML^0T^{-2}]$
(c) $[ML^{-1}T^{-2}]$
(d) $[MLT^{-2}]$

5. If energy (E), Velocity (V) and time (T) are chosen as the fundamental quantities, the dimensional formula of surface tension will be:

(a) $[EV^{-1}T^{-2}]$
(b) $[EV^{-2}T^{-2}]$
(c) $[E^{-2}V^{-1}T^{-3}]$
(d) $[EV^{-2}T^{-1}]$

6. If force (F), velocity (V) and time (T) are taken as fundamental units, then the dimensions of mass are:

(a) [FVT-1]
(b) $[FVT^{-2}]$
(c) $[FV^{-1}T^{-1}]$
(d) $[FV^{-1}T]$

7. The pair of quantities having same dimensions is:

(a) Young's modulus and energy
(b) Impulse and surface tension
(c) Angular momentum and work
(d) Work and torque

8. The dimensions of $(\mu_0 €_0)^{-1/2}$ are

(a) $[L^{1/2}T^{-1/2}]$ (c) $[LT^{-1}]$

(b) $[L^{-1}T]$ (d) $[L^{-1/2}T^{1/2}]$

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

(a) $[ML^2T^{-2}]$ (c) $[ML^2T^{-1}]$

(b) $[ML^{-1}T^{-2}]$ (d) $[MLT^{-1}]$

10. Dimensions of resistance in an electrical circuit, in terms of dimension of mass [M], of length [L], of time [T] and of current [I], would be:

(a) $[ML^2T^{-2}]$ (c) $[ML^2T^{-3}I^{-2}]$

(b) $[ML^2T^{-1}I^{-1}]$ (d) $[ML^2T^{-3}I^{-1}]$

11. The velocity v of a particle at time t ids given by v= at + b/t+c, where a, b and c are constant. The dimensions of a, b and c are respectively

(a) [L^2, T and LT^2] (c) [L, LT and T^2]

(b) [LT^2, LT and L] (d) [LT^{-2}, L and T]

12. The dimensions of universal gravitational constant is:

(a) $[M^{-2}L^2T^{-1}]$ (c) $[ML^2T^{-1}]$

(b) $[M^{-1}L^3T^{-2}]$ (d) $[M^{-2}L^3T^{-2}]$

13. The dimensions of Planck's constant are same

(a) Energy (c) Momentum

(b) Power (d) Angular momentum

14. The dimensional formula for magnetic flux is

(a) $[ML^2T^{-2}A^{-1}]$ (c) $[M^0L^{-2}T^2A^{-2}]$

(b) $[ML^3T^{-2}A^{-2}]$ (d) $[ML^2T^{-1}A^2]$

15. Which of the following is a dimensional constant?

(a) Refractive index (d) Gravitational constant

(b) Poisson's ratio

(c) Relative density

16. The dimensional formula of torque is

(a) $[ML^2T^{-2}]$ (c) $[ML^{-1}T^{-2}]$

(b) $[MLT^{-2}]$ (d) $[ML^{-2}T^{-2}]$

17. If C and R denote capacitance and resistance, the dimensional formula of CR is:

(a) $[M^0L^0T^1]$ (c) $[M^0L^0T^{-1}]$

(b) $[M^0L^0T^0]$ (d) Not expressible in terms of M, L, T.

18. The area of a rectangular field (in m^2) of length 55.3m and breadth 25m after rounding off the value of correct significant digits is:

(a) 1382 (c) 14×10^2

(b) 1382.5 (d) 138×10^1

19. A screw gauge gives the following readings when used to measure the diameter of a wire

Main scale reading: 0 mm

Circular scale reading: 52 divisions

Given that 1mm on main scale corresponds to 100 divisions on the circular scale.

The diameter of the wire from the above data is

(a) 0.052 cm (c) 0.026 cm

(b) 0.52 cm (d) 0.26cm

20. Taking into account of the significant figures, what is the value of 9.99m – 0.0099m?

(a) 9.98m (c) 9.9m

(b) 9.980m (d) 9.9801m

21. A screw gauge has least count of 0.01 mm and there are 50 divisions in its circular scale. The pitch of the screw gauge is:

(a) 0.25 mm (c) 1.0 mm

(b) 0.5 mm (d) 0.01mm

22. In an experiment, the percentage of error occurred in the measurement of physical quantities A, B, C, D are 1%, 2%, 3% and 4% respectively. Then the maximum percentage of error in the measurement X, where $X= A^2B^{1/2}/C^{1/3}D^3$ will be:

(a) $\left(\frac{3}{13}\right)\%$
(b) 16%
(c) -10%
(d) 10%

23. 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 $P= a^3b^2/cd$ % error in P is:

(a) 10%
(b) 7%
(c) 4%
(d) 14%

24. The density of a cube is measured by measuring its mass and length of its sides. If the maximum error in the measurement of mass and length are 4% and 3% respectively, the maximum error in the measurement of density will be:

(a) 7%
(b) 9%
(c) 12%
(d) 13%

25. In the Vernier caliper N divisions of Vernier scale coincides with (N-1) divisions of main scale (in which length of one division is 1 mm). The least count of the instrument should be:

(a) N
(b) N-1
(c) 1/10 N
(d) 1/N -1