**NDA Physics Practice Test: Physical World & Measurement**

**Instructions:** Each of the following questions has four choices. Select the most appropriate answer.

**1. The necessity of measurement in physics fundamentally arises from the need to:**

(a) Perform complex mathematical calculations

(b) Replace qualitative observations with quantitative ones

(c) Prove scientific theories correct

(d) Use sophisticated laboratory instruments

**2. Which of the following is a base physical quantity in the SI system?**

(a) Force

(b) Velocity

(c) Amount of substance

(d) Density

**3. The SI unit of luminous intensity is:**

(a) mole

(b) candela

(c) kelvin

(d) radian

**4. Which of the following is a dimensionless quantity?**

(a) Strain

(b) Stress

(c) Force

(d) Momentum

**5. The dimensional formula for the universal gravitational constant G*G* is:**

(a) [M−1L3T−2][*M*−1*L*3*T*−2]

(b) [ML2T−2][*ML*2*T*−2]

(c) [M−1L2T−3][*M*−1*L*2*T*−3]

(d) [ML3T−2][*ML*3*T*−2]

**6. If v=12lFm*v*=2*l*/1*mF*, where v*v* is frequency, l*l* is length, F*F* is force, and m*m* is mass per unit length, the dimensional formula for m*m* is:**

(a) [ML−1][*ML*−1]

(b) [ML−2][*ML*−2]

(c) [M2L−1][*M*2*L*−1]

(d) [ML2][*ML*2]

**7. A student measures the length of a simple pendulum as 1.25 m and the time for 20 oscillations as 40.0 s. What is the absolute error in the measurement of time period?**

(a) 0.05 s

(b) 0.5 s

(c) 0.025 s

(d) 1.0 s

**8. The density of a cube is calculated by measuring its mass and the length of its side. If the maximum percentage errors in the measurement of mass and length are 2% and 3% respectively, the maximum percentage error in the density is:**

(a) 1%

(b) 7%

(c) 9%

(d) 11%

**9. Which of the following is an example of a random error?**

(a) Zero error in a vernier caliper

(b) Incorrect calibration of a scale

(c) Parallax error while taking a reading

(d) Backlash error in a screw gauge

**10. A physical quantity P$P$ is related to four observables a,b,c$a$,$b$,$c$ and d$d$ as P=a3b2cd$P=cda3b2$. If the percentage errors in the measurement of a,b,c$a$,$b$,$c$ and d$d$ are 1%, 2%, 3% and 4% respectively, the percentage error in P$P$ is:**

(a) 10%
(b) 13%
(c) 15%
(d) 21%

**11. The number of significant figures in 0.00706 is:**

(a) 2
(b) 3
(c) 5
(d) 6

**12. The sum of 12.5, 2.74, and 0.453, expressed with correct significant figures, is:**

(a) 15.693
(b) 15.69
(c) 15.7
(d) 16.0

**13. Which of the following pairs has the same dimensions?**

(a) Work and Torque
(b) Angular momentum and Linear momentum
(c) Impulse and Surface tension
(d) Force and Stress

**14. The method of dimensions cannot be used to derive a formula involving:**

(a) The sum of two exponential terms
(b) A trigonometric function
(c) More than three physical quantities
(d) Both (a) and (b)

**15. The velocity v$v$ of a particle depends on time t$t$ according to the equation v=a+bt+cd+tv$=a+bt+d+tc$. The dimensions of a,b,c,$a$,$b$,$c$, and d$d$ are respectively:**

(a) [LT−1],[LT−2],[L],[T][$LT$−1],[$LT$−2],[$L$],[$T$]
(b) [LT−1],[LT−1],[L],[T][$LT$−1],[$LT$−1],[$L$],[$T$]
(c) [LT−1],[LT−2],[L2T−1],[T][$LT$−1],[$LT$−2],[$L2T$−1],[$T$]
(d) [LT−1],[LT−2],[LT],[T][$LT$−1],[$LT$−2],[$LT$],[$T$]

**16. The SI unit of Planck's constant is equivalent to the unit of:**

(a) Energy
(b) Power
(c) Angular momentum
(d) Linear momentum

**17. The least count of a measuring instrument corresponds to:**

(a) Its resolution
(b) Half of its main scale division
(c) The magnitude of its systematic error
(d) The smallest measurement it can make accurately

**18. A student makes the following measurements:**

**Mass, m=2.50±0.05$m$=2.50±0.05 kg**
**Volume, V=0.50±0.02$V$=0.50±0.02 m³**
**The density ρ=m/V$\rho=m/V$ will be quoted as:**

(a) (5.0±0.7)(5.0±0.7) kg/m³
(b) (5.0±0.2)(5.0±0.2) kg/m³
(c) (5.00±0.07)(5.00±0.07) kg/m³
(d) (5.00±0.25)(5.00±0.25) kg/m³

**19. The dimensional formula for the coefficient of viscosity η$\eta$ is:**
(a) [ML−1T−1][$ML$−1$T$−1]
(b) [MLT−2][$MLT$−2]
(c) [ML−1T−2][$ML$−1$T$−2]
(d) [M2L−1T−1][$M$2$L$−1$T$−1]
**20. Which of the following is the most precise instrument for measuring length?**
(a) A vernier caliper with 20 divisions on the sliding scale
(b) A screw gauge of pitch 1 mm and 100 divisions on the circular scale
(c) A meter scale graduated in millimeters
(d) An optical instrument that measures length to within a wavelength of light
**21. The number 5005 has how many significant figures?**
(a) 2
(b) 3
(c) 4
(d) 5
**22. The dimensional formula for the modulus of rigidity (shear modulus) is the same as that for:**
(a) Pressure
(b) Force
(c) Modulus of elasticity
(d) Both (a) and (c)
**23. A physical quantity Q$Q$ is given by Q=A2B1/2C4D3/2$Q$=$C$4$D$3/2$A$2$B$1/2. The percentage error in A,B,C,$A$,$B$,$C$, and D$D$ are 1%, 2%, 3%, and 4% respectively. The maximum percentage error in Q$Q$ is:**
(a) 10%
(b) 12%
(c) 14%
(d) 16%
**24. The time period of a simple pendulum is given by T=2πlg$T$=2$\pi$$g$$l$. If the measured value of l$l$ is 25.0 cm known to 1 mm accuracy and the time for 100 oscillations is 100 s, measured to 1 s accuracy, the percentage error in the determination of g$g$ is closest to:**
(a) 2%
(b) 3%
(c) 4%
(d) 5%
**25. Which of the following is NOT a fundamental unit in the SI system?**
(a) Ampere
(b) Kelvin
(c) Newton
(d) Candela
**26. The dimensions of 12ϵ0E221ϵ0$E$2, where ϵ0ϵ0 is the permittivity of free space and E$E$ is the electric field, are the same as that of:**
(a) Energy density
(b) Force
(c) Pressure
(d) Both (a) and (c)
**27. The vernier constant of a vernier caliper is:**
(a) The value of one main scale division
(b) The value of one vernier scale division
(c) The difference between the value of one main scale division and one vernier scale division
(d) The sum of the value of one main scale division and one vernier scale division

**28. A screw gauge has a pitch of 0.5 mm and its circular scale has 50 divisions. The least count of the screw gauge is:**
(a) 0.001 mm
(b) 0.01 mm
(c) 0.01 cm
(d) 0.001 cm
**29. The dimensional formula for the universal gas constant R*R* is:**
(a) [ML2T−2K−1][*ML*2*T*−2*K*−1]
(b) [ML2T−2K−1mol−1][*ML*2*T*−2*K*−1*mol*−1]
(c) [MLT−2K−1mol−1][*MLT*−2*K*−1*mol*−1]
(d) [M2LT−2K−1mol−1][*M*2*LT*−2*K*−1*mol*−1]
**30. The number of significant figures in the product 2.5×1.25×5.02.5×1.25×5.0 is:**
(a) 1
(b) 2
(c) 3
(d) 4
**31. A systematic error can be minimized by:**
(a) Taking a large number of observations
(b) Using a different instrument
(c) Finding the mean of the observations
(d) Identifying and correcting its cause
**32. The dimensional formula for the constant a*a* in the van der Waals equation (P+aV2)(V−b)=RT(*P*+*V*2*a*)(*V*−*b*)=*RT* is:**
(a) [ML5T−2][*ML*5*T*−2]
(b) [M−1L5T−2][*M*−1*L*5*T*−2]
(c) [ML−1T−2][*ML*−1*T*−2]
(d) [ML5T−1][*ML*5*T*−1]
**33. The quantity ϵ0dΦEdt*dt*ϵ0*d*Φ*E*, where ϵ0ϵ0 is permittivity and ΦEΦ*E* is electric flux, has the same dimensions as:**
(a) Electric charge
(b) Electric current
(c) Electric potential
(d) Resistance
**34. The number of significant figures in 100.00 is:**
(a) 2
(b) 3
(c) 5
(d) 6
**35. The dimensional formula for the ratio of the universal gravitational constant G*G* and the permittivity constant ϵ0ϵ0 is:**
(a) [M−2L−4T4Q2][*M*−2*L*−4*T*4*Q*2]
(b) [M−1L−3T2Q2][*M*−1*L*−3*T*2*Q*2]
(c) [M−2L−3T4Q2][*M*−2*L*−3*T*4*Q*2]
(d) [M2L−3T−4Q−2][*M*2*L*−3*T*−4*Q*−2]
**36. The time period T*T* of oscillation of a small drop of liquid under surface tension S*S* depends on density ρ*ρ*, and radius r*r*. It is given by T∝ρr3S*T*∝*Sρr*3. This relation is:**
(a) Dimensionally incorrect
(b) Dimensionally correct
(c) Numerically correct
(d) Both (b) and (c)

**37. The main scale of a vernier caliper is calibrated in mm and 19 divisions of the main scale are equal to 20 divisions of the vernier scale. The least count of the instrument is:**
(a) 0.1 mm
(b) 0.05 mm
(c) 0.5 mm
(d) 0.01 mm
**38. The dimensions of the product RC*RC*, where R*R* is resistance and C*C* is capacitance, are the same as that of:**
(a) Frequency
(b) Time
(c) Acceleration
(d) Force
**39. The number 0.00490 has how many significant figures?**
(a) 2
(b) 3
(c) 5
(d) 6
**40. The dimensional formula for the magnetic flux ΦBΦ*B* is:**
(a) [ML2T−2I−1][*ML*2*T*−2*I*−1]
(b) [MLT−2I−1][*MLT*−2*I*−1]
(c) [ML2T−1I−1][*ML*2*T*−1*I*−1]
(d) [ML2T−2I−2][*ML*2*T*−2*I*−2]

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**Answer Key**

1. (b)
2. (c)
3. (b)
4. (a)
5. (a)
6. (a)
7. (c)
8. (d)
9. (c)
10. (b)
11. (b)
12. (c)
13. (a)
14. (d)
15. (a)
16. (c)
17. (a)
18. (a)
19. (a)
20. (d)
21. (c)
22. (d)
23. (d)
24. (b)
25. (c)
26. (d)
27. (c)

28. (b)
29. (b)
30. (b)
31. (d)
32. (a)
33. (b)
34. (c)
35. (c)
36. (b)
37. (b)
38. (b)
39. (b)
40. (a)