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 GG is:
- (a) [M-1L3T-2][M-1L3T-2]
- (b) [ML2T-2][*ML2T*-2]
- (c) [M-1L2T-3][M-1L2T-3]
- (d) [ML3T-2][ML3T-2]
- 6. If v=12IFmv=2/1mF, where vv is frequency, II is length, FF is force, and mm is mass per unit length, the dimensional formula for mm is:
- (a) [ML-1][ML-1]
- (b) [ML-2][ML-2]
- (c) [M2L-1][M2L-1]
- (d) [ML2][ML2]
- 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 PP is related to four observables a, b, ca, b, c and dd as P=a3b2cdP=cda3b2. If the percentage errors in the measurement of a, b, ca, b, c and dd are 1%, 2%, 3% and 4% respectively, the percentage error in PP 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) 15.69 (b) 15.09 (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 vv of a particle depends on time tt according to the equation v=a+bt+cd+tv=a+bt+d+tc. The dimensions of a,b,c,a,b,c, and dd are respectively: (a) [LT-1],[LT-1],[L],[T],[LT-1],[LT	
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(a) (5.0±0.7)(5.0±0.7) kg/m³ (b) (5.0±0.2)(5.0±0.2) 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) $(5.00\pm0.25)(5.00\pm0.25) \text{ kg/m}^3$

19. The dimensional formula for the coefficient of viscosity $\eta\eta$ is:	
(a) [ML-1T-1][<i>ML</i> -1 <i>T</i> -1]	
(b) [MLT-2][<i>MLT</i> -2]	
(c) [ML-1T-2][<i>ML</i> -1 <i>T</i> -2]	
(d) [M2L-1T-1][<i>M2L</i> -1 <i>T</i> -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 the	nat for:
(a) Pressure	
(b) Force	
(c) Modulus of elasticity	
(d) Both (a) and (c)	
23. A physical quantity QQ is given by Q=A2B1/2C4D3/2Q=C4D3/2A2B1/2. The percentage	-
in A,B,C,A,B,C, and DD are 1%, 2%, 3%, and 4% respectively. The maximum percentage er	ror
in QQ is:	
(a) 10%	
(b) 12%	
(c) 14%	
(d) 16%	
24. The time period of a simple pendulum is given by $T=2\pi \lg T=2\pi gl$. If the measured value	
25.0 cm known to 1 mm accuracy and the time for 100 oscillations is 100 s, measured to	l s
accuracy, the percentage error in the determination of gg 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 $12\epsilon 0E221\epsilon 0E2$, where $\epsilon 0\epsilon 0$ is the permittivity of free space and EE	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.	on
(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 RR is:
(a) [ML2T-2K-1][<i>ML2T</i> -2 <i>K</i> -1]
(b) [ML2T-2K-1mol-1][<i>ML2T-2K-1mol-</i> 1]
(c) [MLT-2K-1mol-1][<i>MLT</i> -2 <i>K</i> -1 <i>mol</i> -1]
(d) [M2LT-2K-1mol-1][<i>M2LT</i> -2 <i>K</i> -1 <i>mol</i> -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 aa in the van der Waals
equation $(P+aV2)(V-b)=RT(P+V2a)(V-b)=RT$ is:
(a) [ML5T–2][<i>ML</i> 5 <i>T</i> –2]
(b) [M-1L5T-2][<i>M</i> -1 <i>L</i> 5 <i>T</i> -2]
(c) $[ML-1T-2][ML-1T-2]$
(d) [ML5T–1][<i>ML</i> 5 <i>T</i> –1]
33. The quantity $\epsilon 0 d\Phi E dt dt \epsilon 0 d\Phi E$, where $\epsilon 0 \epsilon 0$ is permittivity and $\Phi E \Phi E$ 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 GG and the
permittivity constant €0€0 is:
(a) [M-2L-4T4Q2][<i>M</i> -2 <i>L</i> -4T4Q2]
(b) [M-1L-3T2Q2][<i>M</i> -1L-3T2Q2]
(c) [M-2L-3T4Q2][<i>M</i> -2 <i>L</i> -3T4Q2]
(d) [M2L-3T-4Q-2][<i>M2L</i> -3 <i>T</i> -4 <i>Q</i> -2]
36. The time period TT of oscillation of a small drop of liquid under surface tension SS depends on
density $\rho \rho$, and radius rr. It is given by $T \propto \rho r 3ST \propto S \rho r 3$. 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 RCRC, where RR is resistance and CC 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 ΦΒΦ <i>B</i> is:
(a) [ML2T-2I-1][<i>ML</i> 2 <i>T</i> -2 <i>I</i> -1]
(b) [MLT-2I-1][<i>MLT</i> -2 <i>I</i> -1]
(c) [ML2T-1I-1][<i>ML2T</i> -1 <i>I</i> -1]
(d) [ML2T-2I-2][<i>ML</i> 2 <i>T</i> -2 <i>I</i> -2]
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)

