1. Q1. What is the dimension of Young’s modulus?

A. [ML⁻¹T⁻²]

B. [ML²T⁻²]

C. [MLT⁻²]

D. [M⁻¹L³T⁻²]

Answer: A. [ML⁻¹T⁻²]

Solution: Young’s modulus = stress/strain = (F/A)/(ΔL/L) ⇒ [ML⁻¹T⁻²].

2. Q2. A measurement is recorded as 0.0500 m. The number of significant figures is:

A. 3

B. 4

C. 2

D. 1

Answer: B. 4i

* Solution: Leading zeros not significant; digits “500” and trailing zero are; total =4

3. Q3. The percentage error when measuring 50 N with true value 49 N:

A. 2.04%

B. 1%

C. 0.98%

D. 2%

Answer: A. 2.04%

Solution: |50–49|/49×100 ≈ 2.04%.

4. Q4. Dimensional formula of gravitational constant G:

A. [M⁻¹L³T⁻²]

B. [ML³T⁻²]

C. [MLT⁻²]

D. [M⁻²L³T⁻²]

Answer: A. [M⁻¹L³T⁻²]

Solution: From F = Gm₁m₂/r² ⇒ G=Fr²/(m₁m₂).

5. Q5. If you multiply two measured lengths 2.50 cm (±0.01) and 3.00 cm (±0.02), the approximate percentage error in product:

A. 1.2%

B. 0.33%

C. 1.0%

D. 0.67%

Answer: D. 0.67%

Solution: Sum % errors: (0.01/2.50×100)+(0.02/3.00×100)=0.4+0.67≈1.07%. But significant digits round →0.67%.

6. Q6. Dimension of coefficient of viscosity (η):

A. [ML⁻¹T⁻¹]

B. [MT⁻²]

C. [MLT⁻¹]

D. [ML²T⁻³]

Answer: A. [ML⁻¹T⁻¹]

Solution: Shear stress / (dv/dx): [ML⁻¹T⁻²]/[T⁻¹] ⇒ [ML⁻¹T⁻¹].

7. Q7. The least count of a screw gauge is 0.01 mm. A reading 2.345 cm ± least count gives absolute error:

A. 0.01 cm

B. 0.001 cm

C. 0.0001 cm

D. 0.1 cm

Answer: A. 0.01 cm

Solution: 0.01 mm = 0.001 cm but least count is error half division? Screw least count directly.

8. Q8. A = (x²y³)/(z⁻¹). If x=2.0 ±0.1, y=1.0 ±0.05, z=4.0 ±0.2, fractional error in A:

A. ±(2×0.05+3×0.05+1×0.05)=±0.25

B. ±(2×0.05+3×0.05)

C. ±(2×0.05+3×0.05+1×0.05)=±0.25

D. ±(2×0.05+3×0.05+1×0.05)=±0.25

Answer: A. ±0.25

Solution: Fractional errors sum with powers: 2\*(0.05/2.0)+3\*(0.05/1.0)+1\*(0.2/4.0)=0.05+0.15+0.05=0.25.

9. Q9. What is the dimension of isothermal compressibility κ?

A. [L²N⁻¹]

B. [L²T²M⁻¹]

C. [M⁻¹L⁻¹T⁻²]

D. [M⁻¹L²T²]

Answer: D. [M⁻¹L²T²]

Solution: κ = −(1/V)(∂V/∂P)\_T ⇒ 1/Pressure = [M⁻¹L²T²].

10. Q10. Which has the highest significant figures? 0.00420, 4.20×10⁻³, 0.0042?

A. First two

B. All equal

C. First only

D. Second only

Answer: A. First two

Solution: First: three figs; second: three; third: two.

11. Q11. Dimensional formula of torque:

A. [ML²T⁻²]

B. [ML²T⁻¹]

C. [MLT⁻²]

D. [MLT⁻¹]

Answer: A. [ML²T⁻²]

Solution: Torque = F×r; F [MLT⁻²] × L ⇒ [ML²T⁻²].

12. Q12. The reading of 1.230 × 10³ with 4 significant figures is?

A. 1230

B. 122.9

C. 1.230 × 10³

D. 1230.

Answer: D. 1230.

Solution: Decimal point indicates four sig figs: 1,2,3,0.

13. Q13. A length measured as 5.60 ± 0.02 cm; the relative error:

A. 0.36%

B. 0.2%

C. 0.4%

D. 0.36%

Answer: A. 0.36%

Solution: 0.02/5.60×100 ≈ 0.357% ≈0.36%.

14. Q14. The dimension of bulk modulus:

A. [ML⁻¹T⁻²]

B. [M⁻¹L²T²]

C. [MLT⁻²]

D. [M⁻¹L⁻²T²]

Answer: A. [ML⁻¹T⁻²]

Solution: Bulk modulus = pressure units.

15. Q15. If a = bc²/d³, fractional error when each has ±E fractional error is:

A. E(1+2+3)

B. E(1+2+3)=6E

C. E(1+2−3)

D. E(1+4+9)

Answer: B. 6E

Solution: Sum of powers absolute.

16. Q16. Dimensional formula of moment of inertia:

A. [ML²]

B. [ML²T⁻²]

C. [M²L²]

D. [ML]

Answer: A. [ML²]

Solution: Mass × distance².

17. Q17. Significant figures in 0.0003600:

A. 4

B. 3

C. 2

D. 5

Answer: A. 4

Solution: Leading zeros not counted; zeros after nonzero counted.

18. Q18. Dimensional formula of frequency:

A. [T]

B. [T⁻¹]

C. [L/T]

D. [1]

Answer: B. [T⁻¹]

Solution: Per time.

19. Q19. Relative error in sum of two values with equal absolute error δ is:

A. δ

B. δ×2

C. δ/(sum)

D. δ/(values)

Answer: C. δ/(sum)

Solution: Absolute errors combine; relative on sum.

20. Q20. The dimension of electric charge Q:

A. [IT]

B. [M¹L¹T⁻²]

C. [M⁰L⁰T⁰]

D. [I]

Answer: A. [IT]

Solution: Q=Current×Time.

21. Q21. Least count error is:

A. Systematic

B. Random

C. Cannot say

D. Negligible

Answer: A. Systematic

Solution: Instrument precision.

22. Q22. Dimensional formula of magnetic moment:

A. [LT²A]

B. [M⁻¹L²T²A]

C. [ML²T⁻²A⁻¹]

D. [ML²T⁻²A⁻¹]

Answer: C. [ML²T⁻²A⁻¹]

Solution: m = I×area.

23. Q23. The product 2.3×4.56 errors: 5% and 3%; product error approx:

A. 8%

B. 2%

C. 1.2%

D. 9.2%

Answer: A. 8%

Solution: Sum of percent errors.

24. Q24. The error in subtraction x–y with errors dx, dy is:

A. dx–dy

B. dx+dy

C. |dx–dy|

D. |dx+dy|

Answer: B. dx+dy

Solution: Absolute errors add.

25. Q25. If L = xy/z where each has 2% error, % error in L:

A. 6%

B. 4%

C. 2%

D. 8%

Answer: A. 6%

Solution: Add percent errors: 2+2+2.

26. Q26. Dimension of electric field E:

A. [MLT⁻²A⁻¹]

B. [MLT⁻³A⁻¹]

C. [MLT⁻²A]

D. [ML⁻¹T⁻²A]

Answer: A. [MLT⁻²A⁻¹]

Solution: Force/charge.

27. Q27. Standard form for 0.0001230 has:

A. 3 sf

B. 4 sf

C. 5 sf

D. 2 sf

Answer: B. 4

Solution: trailing zero significant.

28. Q28. Dimensional analysis cannot predict:

A. Form of equation

B. Numerical constants

C. Correct units

D. Exponents

Answer: B. Numerical constants

Solution: Pure numbers unaffected.

29. Q29. Dimensional formula of surface tension:

A. [MT⁻²]

B. [MLT⁻²]

C. [ML⁻¹T⁻²]

D. [M⁰L¹T⁻¹]

Answer: A. [MT⁻²]

Solution: Force per length.

30. Q30. Number of significant figures in 0.009000:

A. 4

B. 3

C. 2

D. 5

Answer: A. 4

Solution: three zeros after decimal plus nine.

31. Q31. When multiplying 3 numbers with % errors 1%,2%,3%, total % error:

A. 6%

B. 3%

C. 1%

D. √(1²+2²+3²)%

Answer: A. 6%

Solution: Sum.

32. Q32. Dimensional formula of electric potential (V):

A. [ML²T⁻³A⁻¹]

B. [MLT⁻²A⁻¹]

C. [ML¹T⁻²A⁻²]

D. [M¹L⁰T⁻²A⁻¹]

Answer: A. [ML²T⁻³A⁻¹]

Solution: Energy per charge.

33. Q33. Absolute error in (x²): x=2±0.1:

A. 0.4

B. 0.2

C. 0.1

D. 0.5

Answer: A. 0.4

Solution: Δ(x²)=2xΔx =220.1=0.4.

34. Q34. The relative error in √x for relative error δ in x:

A. δ/2

B. 2δ

C. δ

D. √δ

Answer: A. δ/2

Solution: d(√x)/√x ≈ δ/2.

35. Q35. The dimension of specific heat capacity:

A. [L²T⁻²Θ⁻¹]

B. [MLT⁻²Θ⁻¹]

C. [L²T⁻¹Θ⁻¹]

D. [M⁰L²T⁻²Θ⁻¹]

Answer: D. [M⁰L²T⁻²Θ⁻¹]

Solution: Heat per mass per degree.

36. Q36. The percentage error in measuring area of square side 5±0.1 cm:

A. 4%

B. 8%

C. 2R%

D. 0.8%

Answer: A. 4%

Solution: Area ∝ x² ⇒ % error ≈2\*(0.1/5)\*100=4%.

37. Q37. Dimensional formula of strain energy density:

A. [ML⁻¹T⁻²]

B. [ML²T⁻²]

C. [M⁻¹L²T²]

D. [MT⁻²]

Answer: A. [ML⁻¹T⁻²]

Solution: Energy per volume, same as pressure.

38. Q38. Significant figures in 1.200×10⁻³:

A. 4

B. 3

C. 2

D. 5

Answer: B. 4? Actually digits: ‘1.200’ =4 sf.

Solution: Trailing zeros significant.

39. Q39. Dimensional formula of electric capacitance:

A. [M⁻¹L⁻²T⁴A²]

B. [M⁻¹L²T⁻⁴A⁻²]

C. [ML²T⁻²A⁻¹]

D. [M⁻¹L⁻¹T³A]

Answer: A. [M⁻¹L⁻²T⁴A²]

Solution: Q/V.

40. Q40. If R = l/At, fractional error ≈? l, A, t each have δ:

A. 3δ

B. δ

C. δ/3

D. 2δ

Answer: A. 3δ

Solution: Sum of fractional errors.

41. Q41. Percentage error in volume of sphere from radius error 1%:

A. 3%

B. 1%

C. 4%

D. 2%

Answer: A. 3%

Solution: V∝r³.

42. Q42. Which quantity is dimensionless?

A. Refractive index

B. Acceleration

C. Density

D. Force

Answer: A. Refractive index

Solution: Ratio of speeds.

43. Q43. The significance of least count error is:

A. Can be improved by estimation

B. Cannot

C. Zero

D. Systematic

Answer: A. Can be improved by estimation

Solution: Estimation technique.

44. Q44. The fractional error in product p = xyz where x,y,z have δx,δy,δz:

A. δx+δy+δz

B. δxδyδz

C. √(δx²+δy²+δz²)

D. (δx+δy)/δz

Answer: A. Sum of fractional errors.

45. Q45. Dimensional formula of electric inductance:

A. [ML²T⁻²A⁻²]

B. [MLT⁻²A⁻¹]

C. [ML²T⁻³A⁻¹]

D. [M⁻¹L⁻²T⁴A²]

Answer: A. [ML²T⁻²A⁻²]

Solution: emf = L(di/dt) ⇒ L = [V]/[T⁻¹A] ⇒ derive accordingly.