Chapter 2

Units and Measurements

I. One mark questions (PART – A):

1. What is a physical quantity? (k)
2. What is a unit of physical quantity? (K)
3. What are fundamental or basic units? (K)
4. What are derived units? (K)
5. Give the basic units of length in CGS / MKS / FPS / SI system. (K)
6. Given the base units of mass in CGS / MKS / FPS / SI system. (K)
7. How many base units are there in SI system? (K)
8. Name the SI unit of current / temperature / amount of a substance / luminous intensity. (K)
9. Name the SI unit of angle in a plane. (K)
10. Name the SI unit of solid angle. (K)
11. Mention some direct method of measuring length.(U)
12. Name the method of measuring long distances. (K)
13. What is parallax? (K)
14. What is meant by parallactic angle? (K)
15. Express A^0 unit in meters. (U)
16. Name the larger units of length. (K)
17. What is meant by light year? (K)
18. Define unified atomic unit. (K)
19. Which is the instrument used to measure small masses like atom? (K)
20. Mention the types of errors involved in measurements.(K)
21. What is meant by systematic error? (K)
22. What are random errors? (K)
23. What is least count? (K)
24. What is absolute error? (K)
25. How would you determine the true value of a quantity measured several times ? (U)
26. What is relative error? (K)
27. Write the relation for relative error. (K)
28. Write the expression for percentage error. (K)
29. Define astronomical unit (AU) (K)
30. Define parsec. (K)
31. Express parsec in terms of light years. (U)
32. What are significant figures? (K)
33. Does the number of significant figures depend on the choice of unit? (U)
34. State the number of significant figures in the following (U)
    a)0.006 m^2 (b) 2.65 x 10^3 kg (c) 0.2309 m^{-3} (d) 6.320 J (e) 0.006032 m^2
35. Round off the following result to three significant figures(U)
    a) 2.746 (b) 2.744 (3) 2.745 (4) 2.735
36. Define dimension of a physical quantity. (K)
37. Write the dimensions of work. (K)
38. Define dimensional formula of physical quantity. (K)
39. Write the dimensional formula of volume. (K)
40. Define dimensional equation of a physical quantity. (K)
41. Name a physical quantity which has no units and no dimensions(U)

42. Name a physical quantity which has units but no dimensions. (U)
43. Name a physical quantity which has neither unit nor dimension. (U)
44. State the principle of homogeneity of dimensions. (K)

II. Two mark questions (PART – B):

1. Mention the fundamental quantities in SI system (K)
2. Name any two derived SI unit with the name of scientist. (K)
3. What are sources of systematic error? (K)
4. Explain the method of reducing systematic error. (K)
5. Give any two methods of reducing least count error. (K)
6. The distance 'D' of the sun from the earth is 1.496×10^{11} m. if sun's angular diameter is 9.31×10^{-3} rad as measured from earth, find the diameter of the sun. (S)
7. State the rule to find the absolute error when two quantities are added or subtracted.
   Write the expression. (K)
8. State the rule to find the relative error when two quantities are multiplied or divided.
   Write an expression. (K)
9. Find the relative error in Z ,if $Z = A^3 B^{1/2} / C D^{3/2}$ (U)
10. Explain scientific notation method of finding the number of significant figures. (K)
11. Write the dimension of universal gravitational constant. (u)
12. Mention two pairs of physical quantities which have the same dimensions. (U)
13. Mention the physical quantities whose dimensions are (i) $[M^1 L^{-1} T^{-2}]$ (ii) $[M^1 L^2 T^{-3}]$ (K)
14. What are the dimensions of a and b in the relation $F = a^{1/2} + bt^2$ where F is force , *x* is distance and *t* is time. (U)
15. Mention any two constants which have dimensions. (U)
16. Mention any two applications of dimensional analysis. (U)

Three mark questions (PART – C)

1. Check the correctness of following equation by dimensional analysis.
   $x = x_0 + v_0 t + 1/2at^2$
2. Check the correctness of following equation by dimensional analysis.
   $F x = ½ mv_o^2 – ½ mv^2$ (S)

Five mark questions (PART – D):

1. The period of oscillation of a simple pendulum is $T = 2\pi\sqrt{\frac{l}{g}}$. the measured value of L is 20.0 cm known to 1 mm accuracy and time for 100 oscillations of the pendulum is found to be 90 s using a watch of 1s resolution. Find accuracy in % error. (S)
2. The period of oscillation of a simple pendulum depends on its length (l) , mass of the bob (m) and acceleration due to gravity (g) . derive the expression for its time period using method of dimensions. (K)
3. The centripetal force (F) acting on a particle moving uniformly in a circle depends upon its mass (m), velocity (v) and radius of circle (r). derive the expression for centripetal force using method of dimensions._ (S)