



- Q1. Write the differences between scientific law and theory.  
 Q2. Write any three name of scientist with their invention.  
 Q3. What is radar or sonar ?  
 Q4. Time period of a simple pendulum depends on effective length of the pendulum and acceleration due to gravity. Deduce the formula.  
 Q5. Convert MKS unit 'joule' of work into CGS unit 'erg' of work.  
 Q6. Two resistors of resistances  $R_1 = 100 \pm 3 \Omega$  and  $R_2 = 200 \pm 4 \Omega$  are connectes (a) in series (b) in parallel. Find the equivalent resistance of the (a) series combination (b) Parallel combination.

Use for (a) the relation the  $R = R_1 + R_2$  (b) for relation  $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$  &  $\frac{\Delta R}{R^2} = \frac{\Delta R_1}{R_1^2} + \frac{\Delta R_2}{R_2^2}$

- Q7. Find the number of significant figures in following.

(i) 0.006 m<sup>2</sup>    (ii)  $3.64 \times 10^{24}$  kg    (iii) 6.033 N/m<sup>2</sup>    (iv) 0.0006132

- Q8. Check the formula with demension method.

(a)  $F = \frac{mv^2}{r}$     (b)  $v^2 = u^2 + 2as$     (c)  $\frac{1}{2}mv^2 = mgh$

- Q9. Differentiate : (i)  $y = \sqrt{x} + \frac{1}{\sqrt{x}}$     (ii)  $e^x \sin x + e^x \cos x$     (iii)  $5 \log x + \tan x$

- Q10. Integrate : (i)  $\frac{1}{\sqrt{x}}$     (ii)  $\tan^2 x$     (iii)  $x^2 \log x$     (iv)  $e^x \sin x$

- Q11. Write the differences between uniform and nonuniform motion .

- Q12. Using graphical or intergration method and prove  $s = ut + \frac{1}{2}at^2$  &  $v^2 = u^2 + 2as$ .

- Q13. Explain law of triangle and law of parallelogram of vector addition.

- Q14. Find the angle between force  $\vec{F} = 3\hat{i} + 4\hat{j} - 5\hat{k}$  & displacement  $\vec{d} = 5\hat{i} + 4\hat{j} + 3\hat{k}$ . Also projection of force on displacement.

- Q15. For Horizontal projection Derive : (i) Range    (ii) Time Period

- Q16. For projectile motion derive an expression for : (i) Range    (ii) Time Period (iii) Maximum height

- Q17. What do you mean by uniform circular motion.

- Q18. What is inertial ? Explain its type with example.

- Q19. Explain 2nd law of motion and derive expression  $F=ma$ .

- Q20. Horse Cart problem.

- Q21. Prove conservation of linear momentum using Newton's third law.

- Q22. Laws of friction. and write difference between rolling and sliding friction.

- Q23. Define Angle of friction and angle of repose.

- Q24. Find the expression for maximum velocity for banking of road without friction. Or find range of velocity on banking of road with friction,

- Q25. Explain bending of cyclist.

- Q26. Derive an relation between linear momentum and kinetic energy.
- Q27. State and prove work energy theorem for (i) variable force (ii) constant force
- Q28. What is potential energy ? Explain potential energy for spring.
- Q29. Explain conservation of energy for free falling body.
- Q30. Coefficient of restitution ? Write its value for perfectly elastic, inelastic and for perfectly inelastic collision.
- Q31. For elastic collision prove that velocity of separation is equal to velocity of approach.
- Q32. Find loss of kinetic energy in inelastic collision.
- Q33. What is radius of gyration ? Write down expression for centre of mass for a system.
- Q34. State relation between (i) angular momentum and moment of inertia. (ii) Torque and moment of inertia (iii) linear acceleration and angular acceleration. (iv) angular momentum and rotational Kinetic energy.
- Q35. Derive expression for rotational kinetic energy. and prove that  $\theta = \omega_0 t + \frac{1}{2} \alpha t^2$ .
- Q36. State and prove theorem of parallel axis of moment of inertia. or State and prove theorem of perpendicular axis of moment of inertia.
- Q37. Calculate the moment of inertia of rod about its centre of mass.
- Q38. State and prove the Kepler's 1st, 2nd and 3rd laws.
- Q39. What is Newton's law of gravitation ? Explain.
- Q40. Explain variation of acceleration due to gravity : (i) with height above the earth surface (ii) with depth below the earth surface (iii) due rotation of earth.
- Q41. Derive an expression for : (i) potential energy due to earth (ii) escape velocity (iii) Orbital velocity
- Q42. Derive an expression for time period of simple pendulum.
- Q43. What is matter wave ?
- Q44. What are beats ? What is meant by beat frequency and beat period ?
- Q45. What are the factors which affect the speed of sound ?
- Q46. Write differences between stationary wave and progressive wave.
- Q47. What is Doppler's effect ? State it.
- Q48. Equation of a progressive wave is :  $y = 0.30 \sin(314t - 1.57x)$ . Find (i) Direction of propagation of wave. (ii) Angular frequency (iii) Amplitude (iv) Frequency (v) maximum velocity of particle (vi) maximum acceleration of particle (vii) velocity of propagation of wave (viii) wavelength of wave
- Q49. Write the differences between g and G.
- Q50. Explain and state the laws of thermodynamics.
- Q51. Explain Carnot Cycle and prove that  $\frac{Q_1}{Q_2} = \frac{T_1}{T_2}$ .
- Q52. Explain Heat engine or Refrigerator (Heat pump),

**Note : Questions related to Chapters Elasticity, fluid mechanics and Heat & thermodynamic is not mentioned, try to solve their problem from practice set.**

