A–1–C

Total No. of Questions : 21] [Total No. of Printed Pages : 7

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20801-C

PHYSICS

Time : 3 Hours] [Maximum Marks : 70

(Long Answer Type Questions)

1. Find an expression for the time of flight, maximum height and horizontal range of a projectile fired at an angle with the horizontal. When is horizontal range maximum ?

Or

Using calculas, derive (i) $v = U + at$, (ii) $s = ut + 1/2\ at^2$, where the letters have their usual meanings.

2. State and explain law of conservation of linear momentum. Briefly explain recoil of gun; during firing of bullet.

Or

Define angle of banking of roads. Find an expression for the angle of banking for a vehicle on a curved banked road.

3. State Stokes' law of viscous force. Derive the expression for viscous force acting on a sphere falling through a viscous liquid, using dimensional analysis.

Or

Define capillarity. Find an expression for the height of liquid in case of its rise in a capillary tube.

4. Define S.H.M. Find an expression for the displacement, velocity and acceleration of a particle executing S.H.M.

Or

Derive an expression for the time period and frequency of a simple pendulum.

(Short Answer Type Questions)

5. Differentiate ‘sin x' by ab-initio method.

6. Find the dimensions of a and b in the equation $(P + a/v^2)(V-b) = RT$, where P, V, R, T are pressure, volume, universal gas constant and thermodynamic temperature respectively.

7. Derive Kinetic energy-work theorem.

8. State theorem of parallel and perpendicular axis in case of a rigid body in rotational motion.

9. State and explain Newton's universal law of gravitation.

10. State and explain first law of thermodynamics.

11. Write six postulates of Kinetic theory of gases.

12. At what temperature, will the speed of sound in air become double of its value at 0°C.

(Very Short Answer Type Questions)

13. A physical quantity (X) is related to four measurable quantities a, b, c and d as $X = a^2 b^3 c^{-5/2} d^{-2}$. The percentage error in the measurement of a, b, c and d are 1%, 2%, 3% and 4% respectively, What is the percentage error in (X) ?

14. Find the angle between $\vec{A} = \hat{\imath} + 2\hat{\jmath} - \hat{k}$ and $\vec{B} = \hat{\imath} + \hat{\jmath} - 2\hat{k}$.

15. Define Elastic and Inelastic collision.

16. Calculate the K.E. of a uniform circular disc of mass 100 g, radius 5 cm and making 100 rpm about its axis.

17. Define orbital velocity. Write expression for it.

18. State Hooke's law. How will you express it mathematically ?

19. State Zeroth law of Thermodynamics. Hence define temperature.

20. Define degree of freedom. Write the formula for finding degree of freedom of a molecule.

(Objective Type Questions)

21. Do as directed :

(i) If $x = at^2$ and $y = bt^2$, find dy/dx.

(ii) Aeroplanes, jets etc. are streamlined to reduce fluid friction. (True/False)

(iii) A body acted upon by a constant force has uniform :

(A) Velocity

(B) Speed.

(C) Linear acceleration

(D) Momentum

(iv) Rocket works on the principle of conservation of :

(A) Mass

(B) Energy

(C) Linear momentum

(D) Angular momentum

(v) Angular momentum is rotational analogue of linear momentum.

(vi) Is it possible for a body to have inertia but no weight ?

(vii) A refrigerator is a heat engine working in reverse direction.

(True/False)

The degree of freedom of triatomic gas molecule :

(A) 6

(B) 7

(C) Both 6 and 7

(D) None of these

(ix) Two tuning forks give 6 beats per second, when sounded together. The frequency of one of the tuning forks is 480 Hz. If the second tuning fork is loaded with wax and then the number of beats becomes 8 per second, then the frequency of second tuning fork is :

(A) 474 Hz

(B) 486 Hz

(C) 488 Hz

(D) 472 Hz

(x) The harmonics present in a stretched string are :

(A) Odd harmonics

(B) Even harmonics

(C) Even as well as odd harmonics

(D) None of these