

CBSE Sample Papers for Class 11 Physics

MM : 70

Time: 3 Hrs.

General Instructions:

1. *All questions are compulsory.*
2. *The question paper consists of 16 questions.*
3. *Question No. 1 to 8 carry one mark each, Question No. 9 to 18 carry two marks each, Question No. 19 to 27 carry three marks each and question No. 28 to 30 carry five marks each.*
4. *There is no overall choice. However internal choice has been given in some questions. You have to attempt only one of these questions.*
5. *Use of calculator is not permitted.*

1. The volume of an object as a function of time is calculated by $v = At^3 + \frac{B}{t}$ where t is time in seconds and v is in cubic metres. Determine the dimensions of constants A and B .
2. A stone is thrown such that its horizontal range is 4 times the maximum height. Find the angle of projection.
3. A cricket ball of mass 150 g has an initial velocity $\vec{u} = (3\hat{i} + 4\hat{j})$ m/s and final velocity $\vec{v} = -(3\hat{i} + 4\hat{j})$ m/s after being hit. Calculate the change in momentum.
4. What happens to coefficient of friction when the weight of a body is doubled ?
5. If a man in an elevator drops his briefcase but it does not fall to the floor, what can you conclude about the elevator's motion?
6. If angular momentum is conserved in a system whose moment of inertia is decreased, Will its rotational kinetic energy be also conserved? Explain.
7. When a particle rotates in a circle, a central force acts on it directed towards the centre of rotation. Why does this force does no work on the particle?
8. Keeping temperature constant, the pressure of a given mass of a gas is halved. What would be the effect on the volume of the gas.
9. The volume of vessel A is twice the volume of another vessel B and both of them are filled with the same gas. If the gas in A is at twice the temperature and twice the pressure in comparison to the gas in B, what is the ratio of gas molecules in A and B?
10. If velocity (v), force (F) and acceleration (a) are taken as fundamental quantities instead of mass (M), length (L) and time (T), Find the dimensions of Young's modulus of elasticity.
11. Static friction is a self adjusting force. Comment on this statement.
12. Give the statement of Bernoulli's theorem.
The velocity of flow of water in a horizontal pipe is 10 ms^{-1} . Find the velocity head of water.
13. On sounding tuning fork A with another tuning fork B of frequency 384 Hz, 6 beats are produced per second. After loading the prongs of A with wax and then

sounding it again with B, 4 Beats are produced per second, What is the frequency of the tuning fork A?

14. The moment of inertia of two rotating bodies are I_A and I_B ($I_A > I_B$) and their angular momenta are equal. Which one has greater kinetic energy?
15. The block of mass M moving on the frictionless horizontal surface collides with the spring of spring constant k and compress it by length L . Calculate the maximum momentum of the block after collision.



16. A block of mass 0.1 kg is held against a wall by applying a horizontal force of 5 N as shown. If coefficient of friction b/w the wall and the block is 0.5, Find the magnitude of frictional force acting on the block.

5N →

17. Show that the moon would escape for ever from its orbit if its speed were increased by 41.4 %.
18. The displacement of a particle executing SHM is given as $y = 10 \sin \frac{\pi}{3} t$ cm. Find the time taken by the particle to reach from the mean point to a point mid way between the mean point and the extreme point.

OR

A thin uniform rod of length L and mass m is swinging freely about a horizontal axis passing through its end. Its maximum angular speed is ω . Calculate to what maximum height the centre of mass rises

19. Explain impulse-momentum theorem. Give some practical applications of impulse.
20. State and explain work energy principle using calculus method.
21. Explain the concept of centre of mass. Obtain an expression for the position vector of centre of mass of n -particle system.
22. Represent graphically the variation of extension with load in an elastic body. On the graph mark
- Hooke's law region
 - Elastic limit
 - Yield point
 - Breaking point
23. A gas expands from volume V_1 to volume V_2 in (a) isothermal process (b) adiabatic process (c) isobaric process. For which process the work done will be greatest.
24. The volume of an ideal gas is 4 litre, the pressure is 2 atm, and the temperature is 300K. The gas first expands at constant pressure to twice its original volume; it is then compressed isothermally to its original volume, and finally cooled at constant volume to its original pressure.
- Show the process in a p - v -diagram
 - Compute the temperature during the isothermal compression
 - Compute the work done by the gas during the expansion
 - Compute the maximum pressure attained in the process.

25. State the fundamental assumptions of kinetic theory of gases. Prove that $P = \frac{1}{3} \rho c^2$

26. The periodic time of a mass suspended by a spring (force constant k) is T . If the spring is cut into three equal parts, what will be the force constant of each part. If the same mass be suspended from one part, what will be the periodic time.
27. Two planets have masses in the ratio 1 : 10 and radii in the ratio 2 : 5. Compare
- Their densities
 - The acceleration due to gravity on their surface
 - Escape velocities from their surfaces
 - The period of revolution of satellites near to their surfaces.

OR

A rocket starts vertically upwards with speed v_0 . Show that its speed v at a height h

$$\text{is given by } v_0^2 - v^2 = \frac{2gh}{1 + \frac{h}{R}}$$

28. What is friction. State the laws of limiting friction. What are the factors on which coefficient of friction depend. Also write the units of coefficient of kinetic and rolling friction.

OR

What do you mean by Banking of roads. What is the need of banking a circular road. Discuss the motion of car on banked circular road(with friction).

A vehicle running with speed 72 km/hr applies brakes producing a retardation of 3 m/s² while taking a turn of radius 100 m. Find the acceleration.

29. Define coefficient of viscosity. Give its SI unit.

On what factors does the terminal velocity of a spherical ball falling through a viscous liquid depend.

Two steel balls of radii 1 mm and 2 mm acquire the same terminal velocity in two liquids X and Y of same density. Find the ratio of coefficient of viscosity of X and Y.

OR

What do you mean by an ideal fluid? Prove that when an ideal fluid flows through a pipe in streamlined motion, the product of the cross-sectional area of the tube and the velocity of flow is constant.

30. What do you understand by S.H.M? Obtain an expression for time period of a simple pendulum. Show that time period of a simple pendulum of infinite length is 84.6 minutes and not infinite.

OR

Explain with reason whether the propagation of sound waves in air is an isothermal

process or adiabatic process. Using the formula $v = \sqrt{\frac{\gamma P}{\rho}}$, Explain why the speed

of sound in air

- Is independent of pressure
- Increases with temperature
- Increases with humidity (except for H₂ and He)
- How does humidity affect the velocity of sound in H₂ and He?

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