

Sample Paper – 2011
Class – XI
Subject – Physics

Time: 3 Hrs.

MM : 70

General Instructions:

- (i) All questions are compulsory.
- (ii) There are 30 questions in total. Questions 1 to 8 carry one mark each, questions 9 to 18 carry two marks each, questions 19 to 27 carry three marks each and questions 28 to 30 carry five marks each.
- (iii) There is no overall choice. However, an internal choice has been provided in one question of two marks, one question of three marks and ONE question of five marks each. You have to attempt only one of the given choices in such questions.
- (iv) Use of calculators is not permitted.

1. Name a physical quantity which has dimensions $ML^2 T^{-1}$.
2. The speed of an object can never be negative. Why?
3. Why the work done by centripetal force is zero ?
4. You are given two spheres of the same mass, size and appearance, but one of them is solid while the other hollow. If they are allowed to roll down an incline which One will reach the bottom first?
5. What is the nature of motion of an object falling freely under the action of gravity.?
6. A car and a truck are moving on a level road so that their linear momenta are equal. Which one is moving faster?
7. what happens to coefficient of friction when the weight of a body is doubled ?
8. What is the moment of inertia of a solid sphere about its diameter?
9. Define uniform velocity of an object moving along a straight line. What will be shape of velocity time and position time graphs of such a motion?
10. Why fruits fall down from a tree, when its branches are shaken?

OR

Why is spring made of steel not of copper?

11. A light body and a heavy body have the same momentum . Which one will have greater kinetic energy? Justify.
12. A projectile is thrown with a velocity 5 ms^{-1} at an angle of 30° with the horizontal . What is the maximum height attained by it? (Take $g=10\text{ms}^{-2}$).
13. State the conditions necessary for a satellite to appear stationary?
14. Drive an expression for work during an adiabatic process.
15. What force is required to stretch a steel wire of 1 cm^2 cross section to double its length.(take $Y=2 \times 10^{11} \text{ Nm}^{-2}$).
16. State Newton's formula for velocity of sound in gases. what correction was made by Laplace in this formula?
17. A refrigerator is to maintain eatables kept inside at 9°C . If room temperature is 36°C . calculate the coefficient of performance.
18. What is simple Harmonic Motion ? Stete its characteristics.
19. Assuming that the mass M of the largest stone that can be moved by a flowing river depends upon 'v' the velocity. 'p' the density of water and on 'g' the acceleration due to gravity. Using dimensions show that M varies with the sixth power of the velocity of flow.
20. Two balls are thrown simultaneously, A vertically upwards with a speed of 20 m/s from the ground and B vertically downwards from a height of 40 m with the same speed and along the same line of action. At what points do the balls collide? (Take $g=10\text{ms}^{-2}$).
21. What is elastic collision? Calculate the velocities of the two bodies undergoing elastic collision in one dimension.
22. Give the essential features of the kinetic theory of gases. Show that the pressure exerted by a gas is equal to two-third of the average kinetic energy per unit volume of the gas molecule.

23. Show that for a Carnot engine, efficiency of the engine

$$\eta = 1 - T_2/T_1 (T_2 < T_1)$$

Where T_1 is the temperature of the source and T_2 is the temperature of the sink.

24. Define surface tension, write its SI unit.

Find expression for excess pressure inside a liquid drop.

25. Define average and root mean square speeds.

Four molecules of a gas have speeds 2, 4, 6 and 8 km s^{-1} . Calculate their average speed and root mean square speed.

26. State work energy theorem.

The momentum of a body of mass 5 Kg is 500 Kg m/s . Find its kinetic energy.

OR

A body of mass 1 kg initially at rest is moved by a horizontal force of 0.5 N on a smooth frictionless table. Calculate the work done by the force in 10 sec. and show that it is equal to the change in the kinetic energy of the body.

27. Obtain the expression for the linear acceleration of a cylinder

rolling down an inclined plane and hence find the condition for

the cylinder to roll down without slipping.

28. A car accelerated from rest at a constant rate α for some time, after which it decelerate at a constant rate β to come to rest. If the total time elapsed is t seconds, then calculate ,

(i) The maximum velocity attained by the car. &

(ii) The total distance travelled by the car in terms of α , β and t

OR

Deduce following equations for uniformly accelerated motion using integration technique

(i) $S = ut + \frac{1}{2} a t^2$

(ii) $V^2 - U^2 = 2 a s$

Where symbols have their usual meanings

29. State and prove Bernoulli's theorem. Give two applications of it?

OR

Describe stress strain relationship for a loaded steel wire and hence explain the terms elastic limit, yield point, tensile strength.

30. Derive expression for the kinetic and potential energies of a harmonic oscillator. Hence show that total energy is conserved in simple harmonic motion.

OR

What is Doppler's effect of sound ? Obtain an expression for apparent frequency of sound when

- (a) Listener moves towards the stationary source.
- (b) Source and listener are approaching each other.

By-

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