CBSE Board
Class XI Physics
Sample Paper-6

Time: - 3 **Marks: - 70 Marks**

General Instructions

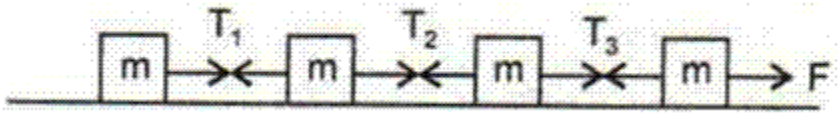
(a) All questions are compulsory.
(b) There are 29 questions in total. Questions 1 to 8 carry one mark each, questions 9 to 16 carry two marks each, questions 17 to 25 carry three marks each and questions 27 to 29 carry five marks each.
(c) Question 26 is a value based question carrying four marks.
(d) There is no overall choice. However, an internal choice has been provided in one question of two marks, one question of three marks and all three questions of five marks each. You have to attempt only one of the given choices in such questions.
(e) Use of calculator is not permitted.
(f) You may use the following physical constants wherever necessary.

$$e = 1.6\times10^{-19} C$$
$$c = 3\times10^{8} ms^{-1}$$
$$h = 6.6\times10^{-34} JS$$
$$\mu_o = 4\pi\times10^{-7} NA^{-2}$$
$$k_B = 1.38\times10^{23} JK^{-1}$$
$$N_A = 6.023\times10^{23} / mole$$
$$m_n = 1.6\times10^{-27} kg$$

1. Write the dimensional formula of torque. (1)

2. Draw velocity - time graph for an object, starting from rest. Acceleration is constant and remains positive. (1)

3. Arrange increasing order the tension T_1, T_2, and T_3 in the figure. (1)



4. Why there is lack of atmosphere on the surface of moon? (1)

5. The triple point of carbon dioxide is 216.55 K. Express this temperature on Fahrenheit scale. (1)

6. In an open organ pipe, third harmonic is 450 Hz. What is the frequency of fifth harmonic? (1)

7. Which types of substances are called elastomers? Give one example. (1)

8. A simple harmonic motion is described by a = -16 x where a is acceleration, x is displacement in m. What is the time period? (1)

9. Volume of a cylinder is $\pi y^2 x$, Where y and x are radius and height of the cylinder respectively. Find percentage error in the measurement of volume. Which of the two measurement height or radius need more attention? (2)

OR

The length and breadth of rectangle are measured as $(a \pm \Delta a)$ and $(b \pm \Delta b)$ respectively. Find (i) relative error, (ii) absolute error in the measurement of area (2)

10. An object moving on a straight line covers first half of the distance at speed v and second half of the distance at speed 2v. find (i) average speed, (ii) mean speed. (2)

11. A block initially at rest breaks into two parts of masses in the ratio 2:3. The velocity of smaller part is (8i + 6j) m/s Find the velocity of bigger part. (2)

12. Find the height from the surface of earth at which weight of a body of mass m will be reduced by 36% of its weight on the surface of earth. (2)

13. Define gravitational potential. Give its S.I unit. (2)

14. An engine has been designed to work between source and sink at temperature 177 °C and 27 °C respectively. If energy input is 3600 J. What is the work done by the engine? (2)

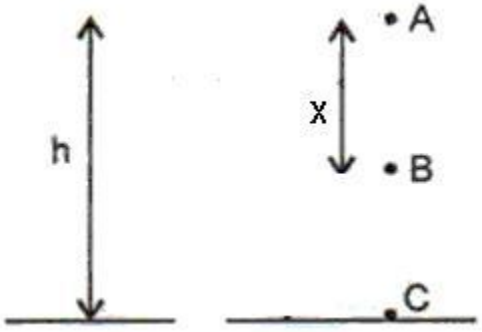
15. Explain:

(i) Why does the air pressure in a car tyre during driving increase?

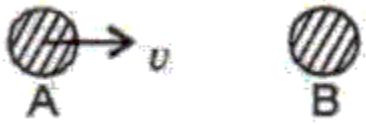
(ii) Why coolant used in a chemical plant should have high specific heat? (2)

16. Calculate the work done in blowing a soap bubble from a radius of 2 cm to 3 cm. The surface tension of the soap solution is 30 dynes cm^{-1}. (2)

17. A body of mass m is released in vacuum from the position A at a height h above the ground. Prove that sum of kinetic and potential energies A, B and C remains constant. (3)



18. Give two points of difference between elastic and inelastic collisions. Two balls A and B with A in motion initially and B at rest. Find their velocities after collision (perfectly elastic). Each ball is of mass "m". (3)



19. A liquid is in streamlined flow through a tube of non- uniform cross-section. Prove that sum of its kinetic energy, pressure energy and potential energy per unit mass remains constant. (3)

20. Give reasons:

(i) Fog particles appear suspended in atmosphere.

(ii) Two boats being moved parallel to each other attract.

(iii) Bridges are declared unsafe after long use. (3)

21. What is the law of equipartition of energy? Determine the value of γ for diatomic gas N_2 at moderate temperature. (3)

22. Show that for small oscillations the motion of a simple pendulum is simple harmonic. Drive an expression for its time period. Does it depend on the mass of the bob? (3)

OR

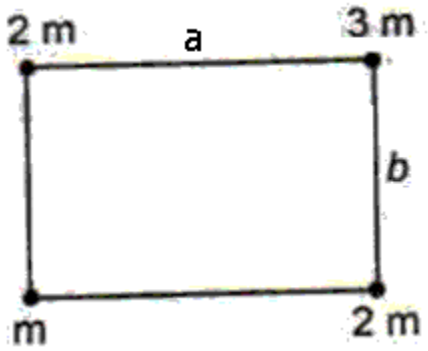
A SHM is described by y = A sin t. What is

(i) the value of displacement y at which speed of the body executing SHM is half of the maximum speed?

(ii) the time at which kinetic and potential energies are equally shared? (3)

23. A solid sphere of mass m and radius r is impure rolling on a horizontal surface. What fraction of total energy of the sphere is:
(a) Kinetic energy of rotation?
(b) Kinetic energy of translation? (3)

24. Four bodies have been arranged at the corners of a rectangle shown in figure. Find the centre of mass of the system. (3)



25. What is a conservative force? Prove that gravitational force is conservative and frictional force is non-conservative (3)

26. Suresh was struggling to understand Kepler's second law of planetary motion. Then his friend Ravi explained to him how the planets move around Sun obeying Kepler's laws of planetary motion.
(a) Comment upon the values of Ravi.
(b) State Kepler's laws of planetary motion. (4)

27. A body is projected with velocity u at angle θ, upward from horizontal. Prove that the trajectory is parabolic. Deduce expression for
(i) horizontal range, and
(ii) maximum height attained. (5)

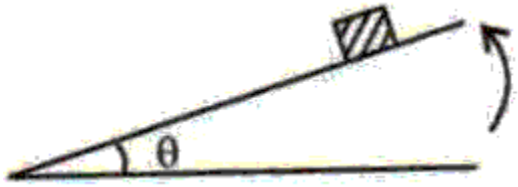
OR

A body is projected horizontally from the top of a building of height h. Velocity of projection is u Find:
(i) the time it will take to reach the ground.
(ii) horizontal distance from foot of building where it will strike the ground
(iii) velocity of the body at any instant. (5)

28. Derive an expression for maximum speed a vehicle should have, to take a turn on a banked road. Hence deduce expression for angle of baking at which there is minimum wear and tear to the tyres of the vehicle. (5)

OR

Define angle of friction. The inclination Î¸ of a rough plane is increased gradually. The body on the plane just comes into motion when inclination Î¸ becomes 30°. Find coefficient of friction. The inclination is further increased to 45°, find acceleration of the body along the plane ($g = 10\ m/s^2$). (5)



29. A progressive wave is given by $y(x,t) = 8\cos(300t-0.15x)$, where x and y are in metre and t in second. What is the

(i) direction of propagation
(ii) wavelength
(iii) frequency
(iv) wave speed
(v) phase difference between two points 0.2 m apart?

OR

Give any three differences between progressive waves and stationary waves. A stationary wave is $y = 12 \sin 300\ t \cos 2x$. What is the distance between two nearest nodes? (5)