CBSE Question Paper

(Physics)
Class - X1

General Instructions

(a) Questions from question no. 1-4 carry 1 marks each, 5-12 carry 2 marks each, 13-27 carry 3 marks each and 28-30 carry 5 marks each.

(b) There is no overall choice but one choice is given in 2 marks question, two choice in 3 marks question and all three choices in five marks question

(c) You may use the following physical constant where ever necessary:

Speed of light C = 3×10^8 ms^{-1}

Gravitational constant G = 6.6×10^{-11} NM^2 Kg^2

Gas constant R = 8.314 J Mol^{-1} k^{-1}

Mass of electron = 9.110×10^{-31} Kg

Mechanical equivalent of heat = 4.185 J Cal^{-1}

Standard atmospheric pressure = 1.013×10^5 Pa

Absolute zero 0K = -273.15^0C

Acceleration due to gravity = 9.8 Ms^{-2}

Use of calculator is not permitted. However you may use log table, if required. Draw neat labelled diagram wherever necessary to explain your answer.

1. A light body and heavy body have equal momentum, which one have greater kinetic energy?
2. What does speedometer of a car indicates?
3. Write down the dimensions of viscosity coefficient
4. Why do we use ball-bearings?

5. How errors are combined in following mathematical operations of physical quantities?

   (i) Subtraction (ii) Product

6. Draw the Velocity - Time graph for following cases when (i) Object is moving in positive direction with acceleration (ii) An object is under free fall.

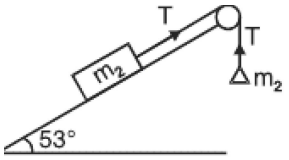
7. Derive the necessary relation for safest velocity of an automobile on a banked road radius r and friction coefficient μ.

8. If variation of position with time t is given by $x = a + bt + ct^2$. Write the dimensions of a, b & c.

9. The forces whose magnitude is in the ratio of 3:5 give a resultant of 35 N. If the angle b/w them is 60°. Find the magnitude of each force.

10. What is an impulse? A ball coming towards a batsman with a certain velocity U. He deflects the ball by an angle Q and its velocity increases to V. Draws A vector diagram to show initial momentum, find momentum and impulse.

11. In the given system of masses m_1 = 5 kg, and coefficient of friction for each constant is 0.2. Calculate the mass m_2, if m_1 is sliding down with an acceleration of 2 ms^{-2}. What will be the tension in the string?



12. The radius and length of a solid cylinder is measured as R = (10.0 +/- 02) cm, l = (20.0 + /- 0.5) cm. Calculate the volume and surface area of the cylinder and error in them.

13. A bomb is exploded into three fragments of mass 1:2:3. The fragment having lighter masses move with a speed of 40 m/s in mutually perpendicular to each other. Calculate the velocity of the third fragment.

14. If $\vec{A}\left(2\hat{i} + 2\hat{j} + 2\hat{k}\right)$ and $\vec{B} = \left(3\hat{i} + 4\hat{j}\right)$. Determine the vector having same magnitude as $\vec{B}$ and parallel to $\vec{A}$.

15. A force acting on an object is given by $\vec{F} = \left(3\hat{i} + 4\hat{j} - 6\hat{k}\right)$ N and the displacement made by it is given by $\vec{r} = \left(6\hat{i} - 2\hat{j} - \hat{k}\right)$. Calculate the work done and power if work is done in 2 s.

16. Define and prove conservation of linear momentum.

17. If the momentum of an object is increased by 50%, Calculate the percentage changes in its K.E.

OR

Two particles having mass ratio of 4:5 have same K.E. Calculate the ration of their linear momentum.

18. The velocity- Time relation of a particle is given by $V = (3t^2 - 2t - 1)$m/s. Calculate using calculus method, the position and acceleration of the particle when the velocity of the particle is zero. Given the initial position of the object is 5m.

19. Express 10J of energy in a new system of units in which 100g, 10 cm, 30 sec are the fundamental units. Determine which one of them is bigger unit of energy.

20. The escape velocity (v) of a body depends upon the mass (m) of body, gravitational acceleration (g) and radius (R) of the planet. Derive the relation for escape velocity dimensionally.

21. State and Prove Work- Energy Theorem. OR 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?

22. If a composite physical quantity in terms of moment of inertia I, force F, velocity V, work W and length L is define as, $Q = (IF\ V^2/WL^3)$. Find the dimension of Q and identify it.

23. Explain why a man who fall from a height on a cemented floor receive more injury then when he fall from the same height on the heap of sand.

24. Is it possible to have collision in which all the kinetic energy is lost? If so cite an example.

OR

Prove that mechanical energy remains conserved during motion when a body of mass m is dropped from a height h.

25. Two masses 8 kg and 12 kg are connected at the two ends of an inextensible string that passes over a frictionless pulley. Find the acceleration of the masses and tension in the string when masses are released.

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

27. Two bodies of masses m_1 *and* m_2 $(m_1 \neq m_2)$ moving with initial velocities u_1 and u_2 $(u_1 > u_2)$, along a straight line in the same direction, suffer perfect head on collision. Find their velocities after collision.

28. State Parallelogram law of vector addition. Find the magnitude and direction of the resultant of two vectors A and B interms of their magnitudes and angle between them.

OR

28 (i) Explain why it is easier to pull a roller than to push it.

(ii) State Newton's laws of motion with at least one example of each. Show that Newton's second law is the real law.

29. What do you understand by friction? Explain static friction, limiting friction and kinetic friction. Which of them self adjusting in nature? Draw a graph to show the variation of frictional force with applied force.

OR

(i) Derive the equation $S = ut + 1/2\ at^2$ using graphical method.

(ii) Show that the velocity of particle in a circular is always tangential to the circle.

30. A projectile is fired in air making an angle θ with horizontal. Show that

(i) Its path is parabolic in nature.

(ii) $Tan\ \theta = 4H/R$ where H is maximum height attained and R is the range of projectile.