Time : 3 Hours
Maximum Marks : 70

PHYSICS

CBSE
Sample Question Papers

Self Assessment Paper 1

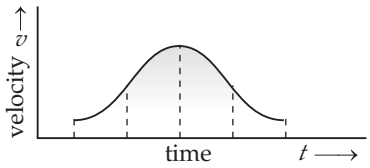
General Instructions :

1. All questions are compulsory. There are 33 questions in all.
2. This question paper has five sections: Section A, Section B, Section C, Section D and Section E.
3. Section A contains ten very short answer questions and four assertion reasoning MCQ's of 1 mark each, Section B has two case based questions of 4 marks each, Section C contains nine short answer questions of 2 marks each, Section D contains five short answer questions of 3 marks each and Section E contains three long answer questions of 5 marks each.
4. There is no overall choice. However internal choice is provided. You have to attempt only one of the choices in such questions.

Section 'A'

All questions are compulsory. In case of internal choice, attempt any one of them.

1. Derive acceleration-time graph from the given velocity time graph. **1**



2. What is gravitational unit of force ? **1**

3. Why the mud from moving wheels of vehicle fly off tangentially ? **1**

OR

Why the sparks from a grinding wheel fly off tangentially ? **1**

4. State the principle of conservation of total mechanical energy. **1**

AI **5.** Under what condition, the torque due to an applied force is zero ? **1**

6. Why does a rubber ball bounce higher on hills than in plains ? **1**

OR

How do we choose zero level of gravitational potential energy?

7. Name the modules which is applicable for solids and fluids ? **1**

8. What is a dia thermic wall? **1**

9. What type of motion particles of a medium execute when a wave passes though the medium ? **1**

OR

Why does evaporation cause cooling ? **1**

10. What is the nature of the force causing S.H.M. ? **1**

OR

Can mechanical waves travel through vacuum ? **1**

For question numbers 11,12,13 and 14, two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

(a) Both A and R are true and R is the correct explanation of A

(b) Both A and R are true but R is NOT the correct explanation of A

(c) A is true but R is false

(d) A is false and R is also false

11. ASSERTION : $\hat{i}+\hat{j}+\hat{k}$ is not a unit vector.

REASON : The addition of unit vector never gives the unit vector.

12. ASSERTION : In an elastic collision, the bodies move with a common velocity after collision.

REASON : The total momentum of the system in an inelastic collision is conserved.

13. ASSERTION : Mass of the body is zero at the centre of earth.

REASON : Acceleration due to gravity is 9.8 m/s^2 at the centre of the earth.

14. ASSERTION : Water flows faster than honey.

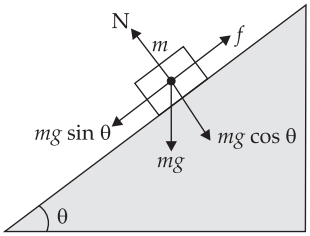
REASON : The coefficient of viscosity of water is less than honey.

Section 'B'

Question numbers 15 to 16 carry 4 marks each.

15. FRICTION :

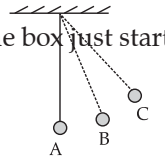
A rectangular box lies on a rough inclined surface. The coefficient of friction between the surface and the box is μ . Let the mass of the box be 'm', 'f' be force of friction and 'N' be the normal reaction.



(i) At what angle of inclination 'θ' of the plane to the horizontal will the box just start to slide down the plane ?

(a) $\tan\theta = \mu$ (b) $\tan\theta = \frac{1}{\mu}$

(c) $\tan\theta = \mu mg$ (d) $\tan\theta = \sqrt{\mu mg}$

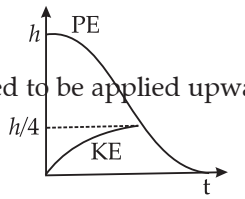


(ii) What is the net force acting on the box if the angle of inclination is increased to such that $\alpha > \theta$?

(a) $f - mg \sin\alpha$ (b) $mg \sin\alpha + f$

(c) $mg \sin\alpha - f$ (d) $mg \sin\alpha$

(iii) What is the force needed to be applied upwards along the plane to make the box just move up with uniform speed ?



(a) $mg(\sin\alpha + \mu\cos\alpha)$ (b) $mg(\mu\cos\alpha - \sin\alpha)$

(c) $\mu mg \cos\alpha$ (d) $\mu mg \sin\alpha$

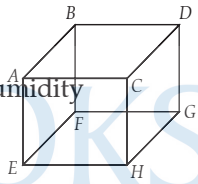
(iv) Which of the following is not true about friction ?
(a) friction is self adjusting force
(b) coefficient of friction depends on nature of surfaces in contact
(c) coefficient of friction depends on area of surfaces in contact
(d) friction acts opposite to the relative motion between any two objects.

(v) Angle of friction is :
(a) angle between force of limiting friction and normal reaction
(b) angle which is resultant of force of limiting friction and normal reaction makes with the direction of force of limiting friction.
(c) angle between normal reaction and applied force.
(d) angle which the resultant of force of limiting friction and normal reaction makes with the direction of normal reaction

16. Propogation of waves :

There are three basic types of waves- mechanical waves, electromagnetic waves and matter waves. Mechanical waves can be longitudinal and transverse waves. Transverse waves can be transmitted in solids, strings and liquid surfaces. Longitudinal waves travel in solids, liquids and gases. The relation between wave velocity, frequency and wavelength is $v = n\lambda$, where v = velocity of wave, υ = frequency of wave and λ = wavelength of wave. Speed of sound through air depends on various factors.

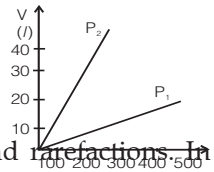
(i) Speed of sound wave in air :
(a) is independent of temperature (b) increases with pressure
(c) increases with increase in humidity (d) decreases with increase in humidity



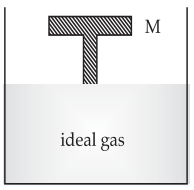
(ii) Change in temperature of medium changes :
(a) frequency of sound waves (b) amplitude of sound waves
(c) wave length of sound waves (d) loudness of sound waves

(iii) With propagation of longitudinal waves through a medium, the quantity transmitted is :
(a) matter (b) energy
(c) Energy and matter (d) energy, matter and momentum.

(iv) Which of the following are true for wave motion ?
(a) Mechanical waves can propagate through all mediums.
(b) Longitudinal waves can propagate through solids only.
(c) Mechanical transverse waves can propagate through solids only.
(d) Longitudinal waves can propagate through vacuum.



(v) A sound wave is passing through air column in the form of compression and rarefactions. In consecutive compressions and rarefactions :
(a) density remains constant (b) Boyle's law is obeyed
(c) bulk modulus of air oscillates (d) there is no transfer of heat

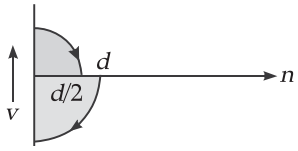


Cube

Section 'C'

Question numbers 17 to 25 carry 2 marks each.

17. What can be represented by the graph given below, where d is height and v is velocity ? **2**



OR

Find the unit and nature of the following multiplication.. **2**
(i) 85 km/h east, **(ii)** (8 h) (5 km/h east).

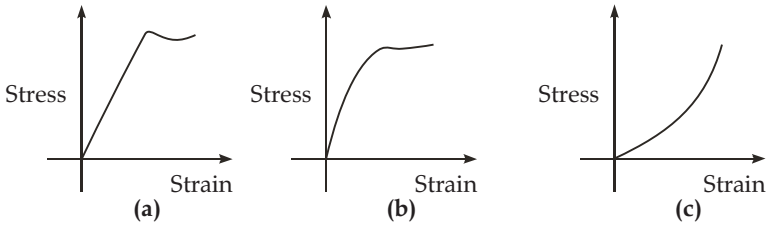
18. What is a spring force ? **2**

OR

The momentum of a body is increased by 50%. What is the percentage change in K.E.?

19. Find the relation between dyne and Newton. **2**

20. Following are the graphs of elastic materials. Which one corresponds to that of brittle material ? **2**



21. How do you distinguish between a gas and vapour ? **2**

22. What are the essential points of difference between sound and light waves ? **2**

OR

The velocity of sound in air at NTP is 331 m/s. Find its velocity when the temperature rise to 91°C and its pressure is doubled. **2**

23. Show that in S.H.M., the acceleration is directly proportional to its displacement at the given instant. **2**

24. Give an analytical method to find the vector sum of three vectors $\vec{P}, \vec{Q}$ and $\vec{R}$. **2**

25. Define coefficient of friction and angle of friction and hence derive a relation between them. **2**

Section 'D'

All questions are compulsory. In case of internal choices, attempt anyone.

26. In a nerve impulse, about 10^5 neutrons are fired. If energy associated with discharge of a single neutron is 10^{-10} J, estimate the energy used. **3**

AI **27.** Show that the area of the triangle contained between the vectors $\vec{a}$ and $\vec{b}$ is one-half of the magnitude of $\vec{a} \times \vec{b}$. **3**

OR

AI A body weighs 63 N on the surface of earth. What is the gravitational force on it due to the earth at a height equal to half the radius of earth ? **3**

28. Determine the volume contraction of a solid copper cube, 10 cm an edge, when subjected to a hydraulic pressure of 7×10^6 Pa. (Bulk Modulus B for copper = 140×10^9 Pa). **3**

29. A certain volume of dry air at NTP is allowed to expand 4 times of its original volume under isothermal conditions. Calculate the final pressure and temperature. **3**

OR

A metre long narrow bore held horizontally (and closed at one end) contains a 76 cm long mercury thread, which traps a 15 cm column of air. What happens if the tube is held vertically with the open end at the bottom ? **3**

30. Discuss strings stretched between fixed points. **3**

Section 'E'

All questions are compulsory. In case of internal choices, attempt anyone.

31. Express cross product of two vectors in cartesian co-ordinate. **5**

OR

A girl riding a bicycle with a speed of 5 ms^{-1} towards north direction, observes rain falling vertically down.

If she increases her speed to 10 m/s, rain appears to meet her 45° to the vertical what is the speed of the rain ?

In what director does rain fall as observed by a ground based observer? **5**

32. Two identical steel cubes (masses 50 g, side 1 cm) collide head-on face to face with a speed of 10 cm/s each. Find the maximum compression of each. Young's modulus for steel ; $Y = 2 \times 10^{11}$ N/m^2. **5**

OR

What are the main features of gravitational force ? **5**

AI **33.** Derive the formula for rise of liquid in a capillary tube (Ascent formula). **5**

OR

Derive an expression for work done in adiabatic expansion. **5**

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