

# APEEJAY SCHOOL, SCHOOL, SHEIKH SARAI-I

## CLASS XI PHYSICS

Time Allowed : 3 Hrs.

Max. Marks : 70

### :: GENERAL INSTRUCTIONS ::

1. All question are compulsory.
2. There are 29 questions in total.  
Questions Nos. 1-8 are very short answer type questions and carry one marks each.
3. Questions Nos. 9 to 16 carry two mark each.
4. Question Nos. 17 to 25 carry three mark each.
5. Question Nos. 26 is value based question carries four marks.
6. Question Nos. 27 to 29 carry five marks.
7. Use of calculator is not permitted.
8. Value of  $g = 9.8 \text{ m/sec}^2$
9. You may use log table wherever necessary.

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- Q. 1. Give one example of each of conservative and non-conservative force. (1)
- Q. 2. If you jerk a piece of paper under a book quick enough, the book will not move. Why? (1)
- Q. 3. Can  $x-t$  graph be a straight line parallel to time-axis? (1)
- Q. 4. Which of the following measurement is most accurate and why? (1)
- (i) 20-gm                      (ii) .0002 gm                      (iii) 2.0 gm
- Q. 5. Give one example of each. (1)
- (i) Zero work                      (ii) Negative work
- Q. 6. Name a physical situation, where the mass of a body changes with time. (1)
- Q. 7. Is it possible to accelerate a particle, if it is travelling at constant speed. Give an example. (1)
- Q. 8. What does the speedometer of a car measure? (1)
- Q. 9. A ball whose kinetic energy is  $E$  is projected at an angle of  $45^\circ$  to the horizontal. What will be the kinetic energy of the ball at the highest point of its flight? (2)
- Q. 10. Calculate the impulse necessary to stop a 1500 kg car travelling at 90 km/hr. (2)
- Q. 11. State and prove parallelogram law of vector addition. (2)
- Q. 12. Explain parallax method for measuring (distance of star) with a suitable diagram. (2)

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- Q. 13. State and prove work energy theorem. (2)
- Q. 14. A shell of mass  $0.02 \text{ kg}$  is fired by a gun of mass  $100 \text{ kg}$ . If the muzzle speed of the shell is  $80 \text{ m/sec}$ . what is the recoil speed of the gun? (2)
- Q. 15. A potential difference of  $V = (100 \pm 2) \text{ volt}$ , when applied across a resistance  $R$  gives a current of  $(10 \pm 0.5) \text{ Ampere}$ . Calculate percentage error in resistance  $R$  given by  $R = \frac{V}{I}$ . (2)
- Q. 16. Write two pairs of physical quantities, which have the same dimensional formula. (2)

Or

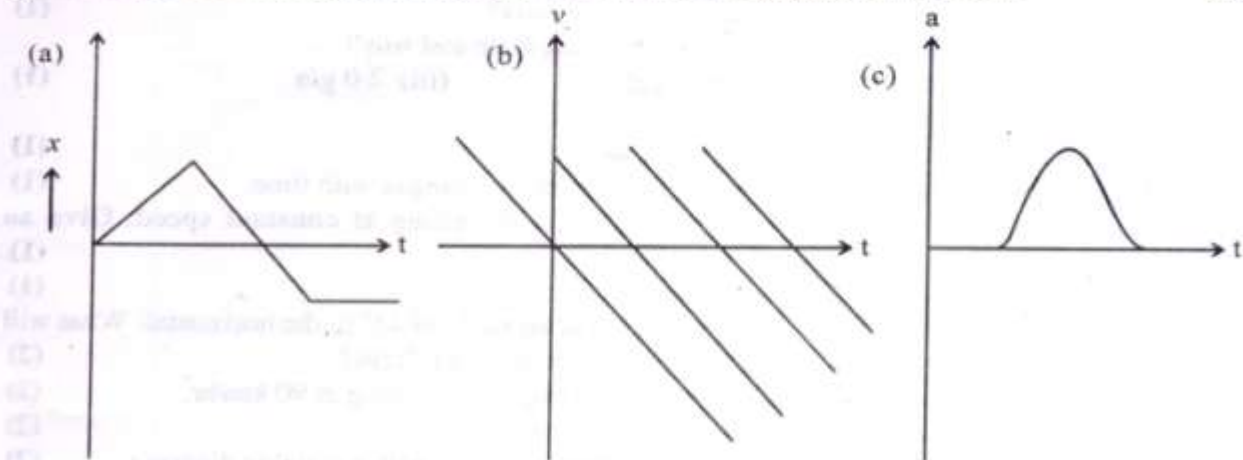
Write two limitations of Dimensional analysis.

- Q. 17. A family uses  $8 \text{ kW}$  of power. (3)
- (a) Direct solar energy is incident on the horizontal surface at an average rate of  $200 \text{ Wm}^{-2}$ . If  $20\%$  of this energy can be converted to useful electrical energy how large an area is needed to supply  $8 \text{ kW}$ ?
- (b) Compare this area to that of the roof of a typical house.
- Q. 18. What do you mean by angle of repose? Obtain its relation with the angle of friction. Diagram is necessary. (3)

Or

What is friction? State and explain the laws of limiting friction. Give some advantages and disadvantages of friction.

- Q. 19. Derive three kinematics equations of motion using graphical method. (3)
- Q. 20. If  $|\vec{A} + \vec{B}| = |\vec{A} - \vec{B}|$ , find the angle between  $\vec{A}$  and  $\vec{B}$ . (3)
- Q. 21. State and prove the principle of conservation of momentum. Apply this law to explain why (i) a gun recoils, when fired. (3)
- Q. 22. Suggest a suitable physical situation for each of the graphs in fig. below. (3)



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- Q. 23. A car moving along a straight highway with speed of 126 Km/h is brought to a stop within a distance of 200m. What is the retardation of the car (assumed uniform) and how long does it take for the car to stop? (3)
- Q. 24. What is meant by banking of roads? What is the need of banking of roads? Obtain an expression for the maximum speed, which a vehicle can safely negotiate a curved road banked at an angle  $\theta$ . (3)
- Q. 25. Discuss the elastic collision of two bodies in one dimensions. Calculate the velocities of the bodies after the collision. (3)
- Q. 26. Rahul was coming to his home from school. The weather was very cold. He noticed that an old man was lying on a road side. He was shivering, Rahul started rubbing the hands and feet of the old man. After some time, the old man opened his eyes and sat on the ground. Rahul helped the man to reach his home. (4)
- (1) Why Rahul rubbed the hands and feet of the man?
  - (2) What are the values shown by Rahul?
- Q. 27. Two towns A and B are connected by a regular bus service with a bus leaving in either direction every 'T' min. A man cycling with a speed of 20 km/hr in the direction P to Q notices that a bus goes past him every 18 min. In the direction of his motion and every 6 min. in the opposite direction. What is the period 'T' of the bus service and with what speed (assumed constant) do the buses ply on the road?

**Or**

Two trains 'A' and 'B' of length 400m each are moving on two parallel tracks, with a uniform speed of 72 km/h in the same direction with 'A' ahead of 'B'. The driver of 'B' decides to overtake 'A' and accelerates by  $2 \text{ m/sec}^2$ . If after 50 sec, the guard of 'B' just brushes past the driver of 'A', what was the original distance between them? (5)

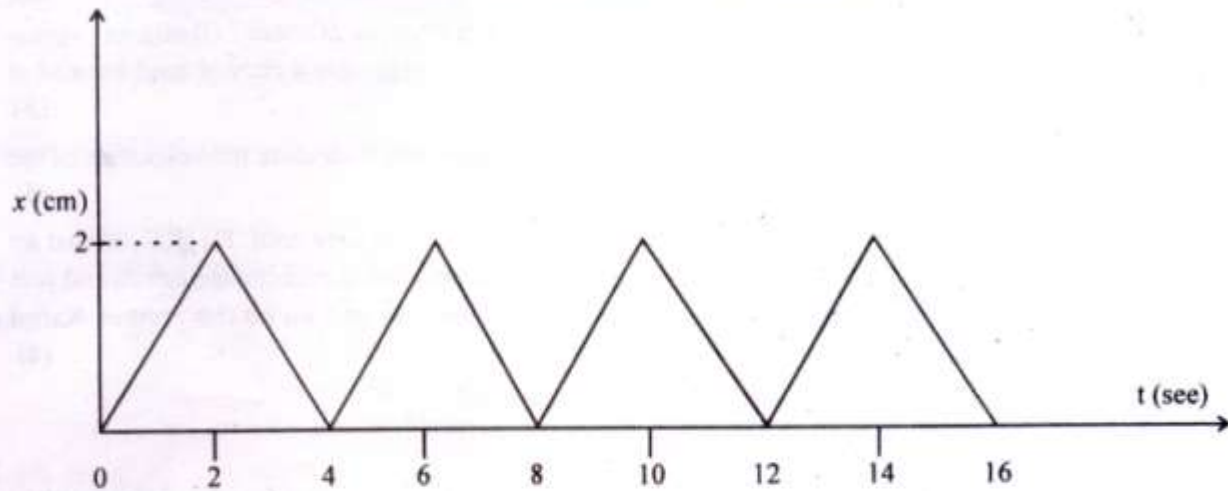
- Q. 28. A projectile is fired with velocity 'u' making an angle ' $\theta$ ' with the horizontal. show that its path is parabolic. Find the expression for (i) Time of Flight and (ii) Maximum height. (5)

**Or**

Define relative velocity of an object w.r.t. another. Find the relative velocity of object 'A' w-r-t 'B':

- (1) When the two objects are moving along a straight line in the same direction with different velocities.
- (2) When the two objects are moving along a straight line in the opposite direction with different velocities.
- (3) When the two objects are moving along a straight line in same direction with same velocities.

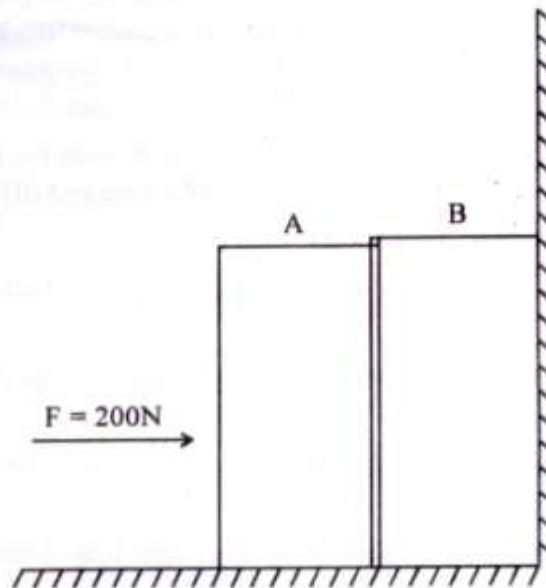
Q. 29. Fig. below shows the position time graph of a particle of mass 0.04 Kg. Suggest a suitable physical context for this motion. What is the time between two consecutive impulses received by the particle? What is the magnitude of each impulse?



Or

Two bodies 'A' and 'B' of masses '5 kg' and '10 kg' in contact with each other rest on a table against a rigid partition. The coefficient of friction between the bodies and the table is 0.15. A force of 200N is applied horizontally at 'A' :

- What are the action-reaction forces between bodies 'A' and 'B'?
- The reaction of the partition. What happens when the partition is removed? (5)



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