HALF YEARLY EXAMINATION 2017-18

CLASS – XI

SUB.: PHYSICS

SET – B

TIME – 3 HRS   M.M -70

ONE MARK QUESTIONS

1.   What are the dimensions of linear mass density?

2.   The displacement of a particle is represented by $x = 3t^2 + 2t + 1$. Write the expression for acceleration.

3.   A body covered a distance of x metre along a semicircular path. Calculate the magnitude of displacement and ratio of distance to displacement.

4.   What are the minimum numbers of forces all numerically equal whose vector sum is zero?

5.   State any two assumptions made in the study of projectile motion.

TWO MARK QUESTIONS

6.   A batsman hits back a ball straight in the direction of the bowler without changing its initial speed of 12m/s. If the mass of the ball is 0.15 kg, determine the impulse imparted to the ball.

7.   What is the function of shockers in a scooter?

8.   Momentum of a body is doubled. By what percent does its kinetic energy change?

OR

If stretch in a spring of force constant k is doubled, calculate the ratio of elastic energies stored in the two cases.

9.   Two circular discs A and B of the same mass and same thickness are made of two different metals of densities $d_A > d_B$. Compare their moment of inertia about the axes passing through centre of gravity and perpendicular to their planes.

10.   Define radius of gyration. State the factors on which it depends.

THREE MARK QUESTIONS

11. The velocity v of sound in a gas depends on the coefficient of volume elasticity E and density d of the gas. Establish the relation dimensionally.

12. Identify the physical quantity x defined by $x = IFV^2/WL^3$ where I is moment of inertia, F is force, V is velocity, W is work and L is length.

13. A ball is dropped from the top of a tower of height h. It covers a distance h/2 in the last second of its motion. How long does the ball remain in air? $g = 10m/s^2$

OR

Prove that the distances traversed during equal intervals of time by a body falling freely from rest, stand to one another in the same ratio as the odd numbers beginning with unity.

14. Use Triangle law of vector addition to find analytically the magnitude and direction of resultant vector.

15. The X and Y components of vector A are 4 and 6 respectively. The X and Y components of vector A + B are 10 and 9 respectively. Calculate the following for vector B

    (i)   Its X and Y components
    (ii)   Its length
    (iii) Angle it makes with X axis

16. For what value of m are the vectors A = 2mi -2j + k and B = mi +mj -4k perpendicular to each other?

17. If a projectile has a constant initial speed and angle of projection, find the relation between the changes in the horizontal range due to change in acceleration due to gravity.

18. Show that a gun will shoot three times as high when elevated at an angle of 60° as when fired at an angle 30° but will have the same horizontal range.

19. What is a projectile? Show that the path of projectile is parabolic when projected at an angle with the horizontal direction.

20. Deduce an expression for maximum velocity of vehicle on a banked road.

21. Justify energy conservation for a freely falling body.

22. Find the centre of mass of three particles of masses 1 kg, 2 kg and 3 kg placed at (1, 2), (0,-1) and (2,-3).

FOUR MARK QUESTION

23. Ram goes to college with his sister Shreya in their own car. The college is about 10 km from home. Ram takes 3 minutes lesser than Shreya. She advises him to drive safely.

    i)   What are the values displayed by Shreya?

    ii)   What is the difference between average speeds of Ram and Shreya if latter takes 15 minutes to drive to college?

FIVE MARK QUESTIONS

24. Derive the expression for the velocity of a varying mass system.

OR

Discuss the motion of a body in a vertical loop. Find the expression of velocity at highest, lowest and horizontal points. Also find tension at these points.

25. Discuss elastic collision in 1-d. Obtain expressions for velocities of the two bodies after such collision.

OR

Discuss inelastic collision in 1-d. Obtain expression for loss of kinetic energy. What is coefficient of restitution? Give its value for different types of collisions.

26. Obtain an expression for the position vector of centre of mass of a two particle system.

OR

Derive an expression for moment of inertia of a thin circular ring about an axis passing through its centre and perpendicular to the plane of the ring.