



SOUNDARYA CENTRAL SCHOOL

Affiliated to CBSE - New Delhi

Mid Term- 2019-2020

Subject: Physics

Max. Marks: 70

Grade: XI

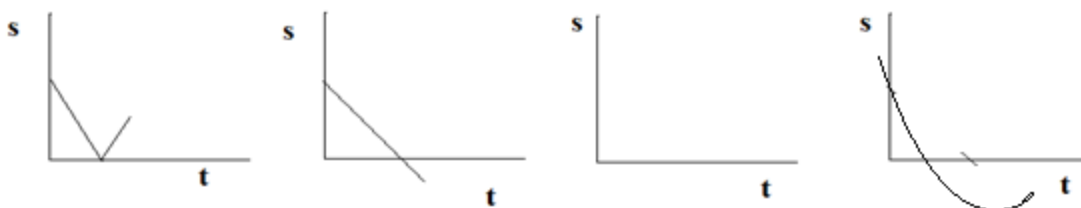
Time: 3hr

General Instruction:-

- All questions are compulsory. There are 37 questions in all.
- This question paper has four sections - Section A, B, C and D
- Section A contains twenty questions of one mark each, Section B contains seven questions of two marks each, Section C contains seven questions of three marks each and Section D contains three questions of five marks each.
- There is no overall choice. However, an internal choice has been provided.
- Use Log tables if necessary and use of calculators not allowed.

Section-A

1. Arrange 1 light year, 1 astronomical unit (AU) and parallaxic second (parsec) in descending order.
a. Par sec, Au, ly b. parsec, ly, AU 3. ly, AU, Parsec d. AU, ly, parsec
2. The initial and final temperature records in an experiment are $(20.5 \pm 0.3)^{\circ}\text{C}$ and $(50.5 \pm 0.2)^{\circ}\text{C}$ Rise in temperature.
i) $(30.0 \pm 0.2)^{\circ}\text{C}$ ii) $(30.5 \pm 0.1)^{\circ}\text{C}$ iii) $30.0 \pm 0.5)^{\circ}\text{C}$ iv) $30.0 \pm 0.1)^{\circ}\text{C}$
3. The dimension of Force
1. (MLT^{-1}) ii) $(\text{M}^2\text{L}^1\text{T}^{-2})$ iii) (MLT^{-2}) iv) (MLT)
4. A body travelling along a straight line covers a distance 'S' with a uniform speed V_1 . If it covers the next distance 'S' with a uniform speed V_2 . Then the average speed V of the body is
a. $V = \frac{(v_1+v_2)}{2}$ b. $V = \sqrt{v_1v_2}$ c. $\frac{2}{v} = \frac{1}{v_1} + \frac{1}{v_2}$ d. $\frac{1}{v} = \frac{1}{v_1} + \frac{1}{v_2}$
5. A body is projected so that its range 'R' is maximum, what is the angle of Projection
a. 90° b. 45° c. 60° d. 30°
6. A body, dropped from the top of a tower, hits the ground and rebounds to half the height. The corresponding position time graph



7. A gun recoils on firing a bullet. This is in accordance with
 - i) Newton's first law of motion
 - ii) Newton's 2nd law of motion
 - iii) Newton's law of gravitation
 - iv) Newton's 3rd law and motion
8. The mass of lift is 500kg what will be the tension in the cable of the lift when it is going up with an acceleration of 2ms^{-2} ?
 - a. 5000N b. 5600N c. 5900N d. 6200N
9. If work is done on a system, depends upon initial and final position only it can be due to
 - a. A conservation or non conservation force
 - b. A non conservative force
 - c. A conservative force
 - d. None of the above
10. A load of 50kg is to be lifted to a height of 15m in 15S the power retirement is
 - i) 540 w b. 450w c. 500w d. zero
11. State the number of significant figures in the following
 - a. 0.007m^2 b. $264 \times 10^{24} \text{ kg}$
12. Name the device used for measuring the mass of atoms and molecules?
13. Define speed of a body. Give its SI Unit.
14. A ball is thrown straight up. What is its velocity and acceleration at the top?
15. Write the value of the following :-
 - i) $J.k=$ ii) $k.k=$
16. What is the angle between velocity vector and acceleration vector in uniform circular motion?
17. A body of mass 5kg is acted upon by two perpendicular forces 6N and 5N. Calculate the resultant magnitude of force acting on the body.
18. Define the co-efficient of static friction
19. State the laws of conservation of energy
20. A truck and a car are moving with the same KE on a straight road. Their engine is simultaneously switched off. Which one will stop at a lesser distance?

Section- B

21. Describe the parallax method for the determination of large distances.
22. Draw position-time graph of a body in the following cases.
- Body at rest
 - Body moving with uniform velocity
23. A body covers half of the journey with a speed a 40m/s and other half with a speed of 60 m/s.
What is the average speed during the whole journey?

(or)

A police van moving on a highway with a speed of 30km/h fires a bullet at a thief's car speeding away in the same direction with a speed of 192km/h. If the muzzle speed of the bullet is 150m/s.
With what speed does the bullet hit the thief's car.

24. Prove the following statement for elevations which exceed or fall short of 45° by equal amounts.
The ranges are equal.

(or)

Give the geometrical meaning of

- Scalar product
 - Cross produce of two vectors.
25. Why does a gun recoil? Drive the recoil velocity of a gun.
26. Define force of friction how does the use of ball bearings reduce friction?
27. What should be the power of an engine required to lift 90 metric tonnes of coal in 60 min from a depth of 200m.

Section-C

28. Compare and contrast the fundamental forces in nature.
29. A planet moves around the sun in a circular orbit. The time period of revolution 'T' of the planet depends on.
- Radius of the orbit (R)
 - Mass of the sun(M)
 - Gravitational Constant (G)
- Show the dimensionally that $T^2 \propto R^3$

(OR)

- a. Check whether the given equation is dimensionally correct $\frac{1}{2} mv^2 = mgh$
30. Differentiate between distance and displacement
31. State parallelogram law of vector addition. Show that resultant and two vectors A and B inclined at an angle θ is

$$R = \sqrt{A^2 + B^2 + 2AB \cos\theta}$$

32. State law of conservation of momentum and prove it using Newton's third law of motion.
33. A stone is dropped from a height h. Prove that the energy at any point in its path is mgh

(OR)

State and prove work energy theory for constant force.

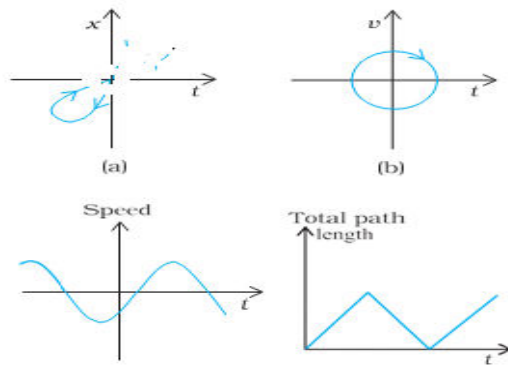
34. A pump on the ground floor of a building can pump up water to fill a tank of volume 30m^3 in 15 min. If the tank is 40m above the ground and the efficiency of the pump is 30% how much electrical power is consumed by the pump?

Section-D

35. Draw velocity time graph of uniformly accelerated motion in one dimension. From the velocity time graph of uniform acceleration motion, deduce the equations of motion in distance and time.

(or)

- a. Look at the graph a) to (d) carefully and state with reasons which of these cannot possibly represent one-dimensional motion of a particle?



- b. A jet aeroplane travelling at the speed of 500kmh^{-1} ejects its products of combustion at the speed of 1500kmh^{-1} relative to the jet plane. What is the speed of the latter with respect to an observer on the ground.

36. a. prove that the path a projectile is a parabole.

- b. A cricket ball is thrown at a speed of 28m/s in a direction 30° above the horizontal calculate.

- i. Maximum height ii. Time of flight

(or)

On a open ground, a motorist follows a track that turns to his left by an angle of 60° after every 500m. Starting from a given turn, specify the displacement of the motorist at the third, sixth and eight turn. Compare the magnitude of the displacement with the total path length covered by the motorist in each case.

37. Derive expression for velocity of a car on a banked circular road having coefficient of friction. Hence write the expression to optimum velocity.

(or)

State Newton's second law of motion. Prove that second law is the real law of motion.
