

QUESTION PAPERS

2024

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Roll No

Total No. of Questions–29] [Total No. of Printed Pages–15

M–354–XI–2324

PHYSICS

(Theory)

Time Allowed—3 Hours Maximum Marks—60

Candidates are required to give their answers in their own words as far as practicable.

Marks allotted to each question are indicated against it.

Special Instructions :

(i) While answering your Questions, you must indicate on your Answer-book the same Question No. as appears in your Question Paper.

(ii) Do not leave blank page/pages in your Answer-book.

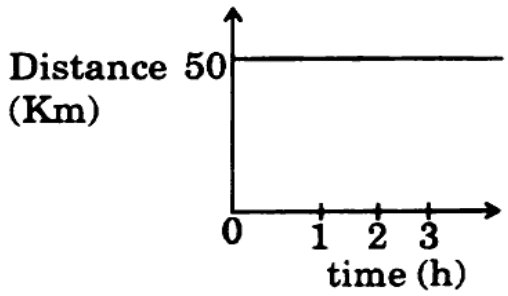
(iii) All questions are compulsory.

(iv) Internal choice is given in some questions.

(v) Answers should be brief and to the point.

(vi) Question Nos. 1-12 are Multiple Choice Questions carrying 1 mark each. Question Nos. 13-18 are very short answer type questions carrying 2 marks each. Question Nos. 19-26 are short answer type carrying 3 marks each and Question Nos. 27-29 are long answer type carrying 4 marks each.

1. Distance time graph for a stationary body is shown in figure. Speed of the body after 2 hours will be :



(a) 50 km h^{-1}

(b) 100 km h^{-1}

(c) 70 km h^{-1}

(d) 0 km h^{-1}. 1

Q. No. 2 and 3, consist of two statements Assertion(A) and Reason(R). Answer these questions selecting the appropriate option given below :

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

(b) Both A and R are true and R is not the correct explanation of A.

(c) A is true but R is false

(d) A is false but R is true.

2. Assertion : Hot soup tastes better than the cold soup.

Reason: Hot soup has high surface tension and it does not spread properly on our tongue. 1

3. Assertion : The force of friction between narrow types and road is equal to the force of friction between wider tyres and the same road.

Reason : Force of friction opposes the relative motion of an object. 1

Read the following passage and answer questions no. 4 and 5 :

In all type of collision, the linear momentum is conserved but the kinetic energy is not conserved in inelastic collision. When a body suspended from weightless string is struck by another body moving with high speed and both the bodies stick to each other and move as one body, the collision between them is known as perfectly inelastic collision.

4. When two bodies stick together after collision and move as one body, the collision is :

(a) Elastic

(b) Inelastic

(c) Both Elastic and Inelastic

(d) Perfectly Inelastic. 1

5. **Which quantity is conserved during all types of collision?**

(a) Linear momentum

(b) Kinetic energy

(c) Both Linear momentum and Kinetic energy

(d) None of these. 1

6. **Match the Column given below :**

	Column–I	Column–II
(I)	Movement of the tip of the minute hand of a clock	(A) Torque
(II)	A stone falling from a height in straight line path	(B) Rational motion
(III)	Moving wheel of a sewing machine	(C) Circular motion
(IV)	Rotational analogue of force	(D) Linear motion

(a) (I)–A (II)–B (III)–C (IV)–D

(b) (I)–D (II)–A (III)–B (IV)–C

(c) (I)–C (II)–D (III)–B (IV)–A

(d) (I)–B (II)–C (III)–D (IV)–A. 1

7. Match the values of Physical quantities given in Column I with the Numerical values given in Column II

Column–I	Column–II
(I) Acceleration due to gravity at the centre of earth	(A) 9.8 ms^{-2}
(II) Escape speed of earth	(B) 6.67×10^{-11} $Nm^2 kg^{-2}$
(III) Universal Gravitational constant	(C) 0
(IV) Acceleration due to gravity	(D) 11.2 kms^{-1}

(a) (I)–D (II)–A (III)–B (IV)–C

(b) (I)–C (II)–A (III)–D (IV)–B

(c) (I)–A (II)–B (III)–D (IV)–C

(d) (I)–C (II)–D (III)–B (IV)–A. 1

8. SI unit of tensile stress :

(a) Nm^{-2}

(b) Nm

(c) Nm^{-1}

(d) Nm^{-3}. 1

9. The door of domestic refrigerator is kept open while the switch is 'ON'. Then the room is:

(a) Heated

(b) Cooled

(c) Neither heated nor cooled

(d) None of these. 1

10 The ratio of specific heats (γ) of diatomic gas is :

(a) $\frac{3}{5}$

(b) $\frac{5}{7}$

(c) $\frac{7}{9}$

(d) $\frac{7}{5}$. 1

11. In SHM, $y = 10^{-2}\sin\left(10\pi t + \frac{\pi}{6}\right)$ metre. The amplitude of the particle is :

(a) $\frac{\pi}{6}$ m

(b) 10^{2} m

(c) 10π m

(d) $\left(10\pi + \frac{\pi}{6}\right)$ m. 1

12. If a source is moving away from a stationary observer with velocity of sound, frequency observed will be :

(a) more

(b) less

(c) unchanged

(d) None of these. 1

13. What is difference between Distance and Displacement ? 2

14. "It is the velocity not the acceleration which decides the direction of motion of a body". Justify this statement with the help of a suitable example. 2

15. Explain why passengers are thrown forward from their seats when a speeding bus stops suddenly. 2

16. What do you mean by Banking of Circular roads ? What is its need ? 2

17. Show that surface tension is numerically equal to surface energy.

Or

Why water is preferred to any other liquid in hot water bottles ? 2

18. Draw Stress-strain curve to show the variation of Strain with Stress. 2

19. Derive by method of dimensions, an expression for the time period (T) of oscillations of the simple pendulum, assuming that this time period depends upon :

(a) Length of Pendulum (l).

(b) Acceleration due to gravity (g). 3

20 Derive an expression for the velocities of two bodies after elastic one dimensional collision. Hence show that two bodies of same mass interchange their velocities after elastic one dimensional collision.

Or

State and prove Work Energy theorem. 3

21. Derive an expression for the rotational Kinetic energy of a body and hence define moment of inertia of a body. 3

22. Derive an expression for the Total Energy and Binding Energy of an orbiting Satellite.

Or

Show that value of acceleration due to gravity decreases with altitude. 3

23. A piece of copper having a rectangular cross-section of 15.2 mm × 19.1 mm is pulled in tension with 44,500 N force producing only elastic deformation. Calculate the resulting strain. Given Shear modulus of elasticity of copper is $42 \times 10^9 Nm^{-2}$. 3

24. What is Heat Engine ? Write its principle and explain its construction and working. 3

25. Estimate the total no. of air molecule (inclusive of Oxygen, Nitrogen, Water vapour and other Constituent) in a room of capacity 25.0 m^3 at a temperature of 27°C and 1 atmospheric pressure. Given R = 8.314 J $mol^{-1}K^{-1}$. 3

26. What is Simple Pendulum ? Show that the motion of Pendulum is SHM and hence deduce an expression for time period of the Pendulum. 3

27. State Triangle law of Vector addition. Give its analytical treatment to find the magnitude and direction of a Resultant vector.

Or

What do you mean by Projectile ? A Projectile is fired at some angle with the horizontal. Show that its path is Parabolic. Also find the expression for maximum height and horizontal range. 4

28. (a) Define Centripetal force with example. Write expression for it. 2

(b) Friction is necessary evil. Justify. 2

Or

(a) A constant retarding force of 50N is applied to a body of mass 20 kg moving initially with a speed of 15 ms^{-1}. How long does the body take to stop ? 2

(b) State Newton's second law of motion. Prove that $\vec{F} = m\vec{a}$ where symbols have their usual meanings. 2

29. (a) Describe various modes of vibration in a closed organ pipe and show that the ratio of frequencies of different harmonics in closed organ pipe is 1:3:5:7. 2

(b) Derive an expression for elastic potential energy of a Spring. 2