

R1025

No. of Printed Pages : 4

Register Number

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11**PART - III****இயற்பியல் / PHYSICS**

(English Version)

Time Allowed : 3.00 Hours]

[Maximum Marks : 70

- Instructions :**
- (1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately
 - (2) Use **Blue** or **Black** ink to write and underline and pencil to draw diagrams.

PART - I

- Note :**
- (i) Answer **all** the questions. **15x1=15**
 - (ii) Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer.

1. If a particle has negative velocity and negative acceleration, its speed
 - (a) increases
 - (b) decreases
 - (c) remains same
 - (d) zero
2. Force acting on the particle moving with constant speed is
 - (a) always zero
 - (b) need not be zero
 - (c) always non zero
 - (d) cannot be concluded
3. The dimensional formula of Planck's constant h is
 - (a) $[ML^2T^{-1}]$
 - (b) $[ML^2T^{-3}]$
 - (c) $[MLT^{-1}]$
 - (d) $[ML^3T^{-3}]$
4. The work done by the conservative force for a closed path is
 - (a) always negative
 - (b) zero
 - (c) always positive
 - (d) not defined
5. A rigid body rotates with an angular momentum L. If its kinetic energy is halved, the angular momentum becomes,
 - (a) L
 - (b) $\frac{L}{2}$
 - (c) 2L
 - (d) $\frac{L}{\sqrt{2}}$
6. The work done by the Sun's gravitational force on the Earth is
 - (a) always zero
 - (b) always positive
 - (c) can be positive or negative
 - (d) always negative
7. For a given material, the rigidity modulus is $\left(\frac{1}{3}\right)^{rd}$ of Young's modulus. Its Poisson's ratio is
 - (a) 0
 - (b) 0.25
 - (c) 0.3
 - (d) 0.5

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8. The graph between volume and temperature in Charles' law is
(a) an ellipse (b) a circle
(c) a straight line (d) a parabola
9. The average translational kinetic energy of gas molecules depends on
(a) number of moles and T (b) only on T
(c) P and T (d) P only
10. In a simple harmonic oscillation, the acceleration against displacement for one complete oscillation will be
(a) an ellipse (b) a circle (c) a parabola (d) a straight line
11. An air column in a pipe which is closed at one end, will be in resonance with the vibrating body of frequency 83Hz. Then the length of the air column is
(a) 1.5 m (b) 0.5 m (c) 1.0 m (d) 2.0 m
12. Displacement is a quantity and Distance is a quantity.
(a) Scalar, Scalar (b) Vector, Scalar (c) Scalar, Vector (d) Vector, Vector
13. The dimension of the physical quantity X in the equation $\text{Force} = \frac{x}{\text{Density}}$ is given by
(a) $[M L^4 T^{-2}]$ (b) $[M^2 L^{-2} T^{-2}]$ (c) $M^2 L^2 T^{-2}$ (d) $ML^{-4} T^{-1}$
14. The mean free path is directly proportional to
(a) Pressure (b) Size of molecule (c) Temperature (d) Velocity
15. The coefficient of restitution (e) for a perfectly elastic collision
(a) 1 (b) 0 (c) -1 (d) ∞

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PART – II**Note :** Answer **any six** questions. Question No. **21** is **compulsory**. **6x2=12**

16. What is couple and give an example.
17. How will you measure the diameter of the Moon using parallel method?
18. A rolling wheel has velocity of its centre of mass as 5 ms^{-1} . If its radius is 1.5m and angular velocity is 3 rads^{-1} , then check whether it is in pure rolling or not.
19. Water falls from the top of a hill to the ground. Why?
20. Define coefficient of elasticity.
21. A mobile phone tower transmits a wave signal of frequency 900MHz. Calculate the length of the waves transmitted from the mobile phone tower.
22. State the second law of thermodynamics in terms of entropy.
23. What is force constant of spring?
24. State the law of equipartition of energy.

PART – III**Note :** Answer **any six** questions. Question No. **30** is **compulsory**. **6x3=18**

25. When a cricket player catches the ball, he pulls his hands in the direction of the ball's motion. Why?
26. Compare conservative and non-conservative forces.
27. Explain - gravitational potential energy.
28. What is meant by a reversible and irreversible process?
29. Derive the equation for work done by torque.
30. A room contains oxygen and hydrogen molecules in the ration 3:1. The temperature of the room is 27°C . The molar mass of O_2 is 32 g mol^{-1} and of H_2 is 2 g mol^{-1} . The value of gas constant R is $8.32 \text{ J mol}^{-1} \text{ K}^{-1}$
Calculate the rms speed of oxygen and hydrogen molecule.
31. Soldiers are not allowed to march on a bridge. Why?
32. Explain in detail about error in the division or quotient of two quantities.
33. What are the Applications of viscosity?

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PART – IV

Note : Answer **all** the questions.**5x5=25**

34. (a) State and prove parallel axis theorem.

(OR)

(b) State and prove Bernoulli's theorem for a flow of incompressible, non-viscous, and streamlined flow of fluid.

35. (a) Obtain an expression for the time period T of a simple pendulum. The time period depends on :(i) mass ' m ' of the bob(ii) length ' l ' of the pendulum and(iii) acceleration due to gravity ' g ' at the place where the pendulum is suspended. (Constant $k = 2\pi$)**(OR)**(b) Derive the equation of motion, range and maximum height reached by the particle thrown at an oblique angle θ with respect to the horizontal direction.

36. (a) Derive the time period of satellite orbiting the earth.

(OR)

(b) Prove the law of conservation of linear momentum. Use it to find the recoil velocity of a gun when a bullet is fired from it.

37. (a) Arrive at an expression for elastic collision in one dimension and discuss various cases.

(OR)

(b) How will you determine the velocity of sound using resonance air column apparatus?

38. (a) Discuss in detail different types of equilibrium and their conditions.

(OR)

(b) Discuss in detail the energy in simple harmonic motion.

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