

V11P

Standard 11
PHYSICS

Marks: 70

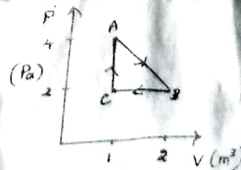
Time: 3.00 hrs

Part - I

15×1=15

Note: Choose the correct answer. Each question carries one mark.

- 1) If the force is proportional to square of velocity, then the dimension of proportionality constant is
a) $[MLT^0]$ b) $[MLT^{-1}]$ c) $[ML^{-2}T]$ d) $[ML^{-1}T^0]$
- 2) If $\vec{A} \times \vec{B} = \vec{A} \cdot \vec{B}$, then the angle between the two vectors is equal to
a) $\frac{\pi}{2}$ b) $\frac{\pi}{4}$ c) π d) zero
- 3) The work done by the conservative force for a closed path is
a) always negative b) zero c) always positive d) not defined
- 4) Which of the following is correct?
a) Rolling friction is less than kinetic friction
b) Angle of repose is equal to angle of friction
c) The frictional force is actually the electro magnetic force between the atoms on the two surfaces
d) All of the above
- 5) A couple produces
a) pure rotation b) pure translation c) rotation and translation d) no motion
- 6) If the acceleration due to gravity becomes 4 times its original value, then escape speed
a) remains same b) 2 times of original value
c) becomes halved d) 4 times of original value
- 7) The reynolds number for the liquid flow is 1000, it is
a) turbulent b) unsteady c) stream line d) all of the above
- 8) In a reverible process, the efficiency of heat engine working between 100°C and 300°C is
a) 48% b) 52% c) 22% d) 44.5%
- 9) If the temperature and pressure of a gas is doubled the mean free path of the gas molecules
a) remains same b) doubled c) tripled d) quadrapoled
- 10) A spring is connected to a mass 'm' suspended from it and its time period for vertical oscillation is T_1 . The spring is now cut into two equal halves and the same mass is suspended from one of the halves. The period of vertical oscillation is
a) $T_2 = \frac{T_1}{2}$ b) $T_1 = \frac{T_2}{2}$ c) $T_2 = \sqrt{2} T_1$ d) $T_2 = \frac{T_1}{\sqrt{2}}$
- 11) An air column in a pipe which is closed at one end, will be in resonance with the vibrating body of frequency 83 Hz. 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) When temperature of a liquid increases, viscosity of the liquid
a) increases b) decreases c) become zero d) remain the same
- 13) In the given P-V diagram for a thermodynamics process, work done in one cycle is
a) 4J b) 2J
c) 3J d) 1J
- 14) Which of the following physical quantities cannot be represented by a scalar?
a) Mass b) length c) momentum d) magnitude of acceleration
- 15) A ball of mass 1 kg and another of mass 2 kg are dropped from a tall building whose height is 80 m. After a fall of 40 m each towards Earth, their respective kinetic energies will be in the ratio of
a) 1:2 b) $1:\sqrt{2}$ c) $\sqrt{2}:1$ d) 2:1



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Part - II

Note: i) Answer any six of the following questions.

ii) Answer the questions no. 24 compulsorily.

- 16) What are scalars and vectors?
- 17) What is inertia of motion? Give one example.
- 18) Define the term work in Physics.
- 19) State the law of conservation of angular momentum.
- 20) Define gravitational potential energy.
- 21) State Hooke's law in elasticity.
- 22) Write the statement of Zeroth law of thermodynamics.
- 23) What is simple harmonic motion?
- 24) In a horizontal pipe of non-uniform cross section, water flows with a velocity of 1 ms^{-1} when the diameter of the pipe is 20 cm. The velocity of water is 1.5 ms^{-1} , find the diameter of the pipe.

Part - III

6 × 3 = 18

Note: i) Answer any six of the following questions.

ii) Answer the questions no 33 compulsorily.

- 25) What are the limitations of dimensional analysis?
- 26) Write about Impulse.
- 27) State and prove work-energy theorem.
- 28) Obtain an expression for rotational kinetic energy of a rigid body about an axis.
- 29) Derive the formula for time period of satellite orbiting the Earth.
- 30) Mention the practical applications of capillarity.
- 31) State Boyle's law and Charle's law. Using it obtain the ideal gas equation.
- 32) Derive an expression for velocity of a particle in Simple Harmonic Motion.
- 33) An object is projected at an angle such that the horizontal range is 4 times of the maximum height. What is the angle of projection of the object.

Part - IV

5 × 5 = 25

Note: i) Answer all the questions.

- 34) a] Obtain an expression for the time period 'T' of a simple pendulum. The time period 'T' depend upon (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 expression for moment of inertia of a rod about its centre and perpendicular to the rod.
- 35) a] i) Write any four properties of vector product between two vectors.
ii) A particle moves in a circle of radius 10 m. Its linear speed is given by $v = 3t$. Where t is in second, v is in ms^{-1} . Find the centripetal and tangential acceleration at $t = 2$ second. (OR)
- b] Derive an expression for escape speed.
- 36) a] Derive the Meyer's relation, $C_p - C_v = R$ for an ideal gas. (OR)
- b] Arrive an expression for velocities of two bodies undergoing perfect elastic collision in one dimension.
- 37) a] State and prove Bernoulli's theorem for a flow of incompressible, non-viscous and streamlined flow of fluid. (OR)
- b] Discuss in detail the energy in simple harmonic motion.
- 38) a] i) Describe Newton's formula for velocity of sound waves in air.
ii) Two sound waves with wavelengths 5 m and 6 m propagates in a gas with a velocity 330 ms^{-1} . Calculate the number of beats per second. (OR)
- b] With the help of freebody diagram describe the motion of an object on an inclined plane. Hence obtain expressions for acceleration and velocity of a body.