

Time: 3 hours.

Subject: PHYSICS

Max. Marks: 70

PART – A

I. Pick the correct option among the four given options for ALL of the following questions: **15 × 1 = 15**

1. The number of significant figures in 0.002002 is
A) 4 B) 3 C) 2 D) 1
2. Position time graph for a particle is a straight line parallel to time axis. The particle is
A) moving with a uniform velocity
B) at rest
C) moving with uniform acceleration
D) moving with non-uniform acceleration
3. Which of the following is not a vector quantity.
A) momentum B) weight C) potential energy D) nuclear spin
4. While catching a ball, in order to increase the time of impact, and reduce the injury, a cricket Player must
A) move his hands opposite to the direction of motion of the ball.
B) move his hands in the direction of motion of the ball.
C) hit the hands to the ball exactly in opposite direction.
D) stop the ball at an instant.
5. The product of mass and velocity is
A) force B) momentum C) velocity D) acceleration
6. 1 kilowatt hour (kWh) is equal to
A) 4.2J B) 3.6×10^6 J C) 3.6×10^{-5} J D) 8.316J
7. A body will be in rotational equilibrium, if net
A) Torque acting on the body is zero.
B) Force acting on the body is zero.
C) Torque acting on the body is non zero.
D) Force acting on the body is non zero.
8. universal law of gravitation was formulated by
A) Kepler B) Galileo C) Henry Cavendish D) Sir Isaac
Newton
9. S.I unit of Young's modulus is
A) Nm^{-1} B) Nm C) Nm^2 D) Nm^{-2}
10. Stoke's law is given by
A) $F = 6\pi\eta av$ B) $F = 6\pi av$ C) $F = 6\pi\eta v$ D) $F = 6\pi\eta av$

11. As pressure increases, boiling point
 A) decreases B) increases C) remains the same D) none of these
12. First law of thermodynamic is based on the principle of
 A) conservation of angular momentum
 B) conservation of linear momentum
 C) conservation of temperature
 D) conservation of energy
13. The mean energy of a molecule of an ideal gas is
 A) $2kT$ B) kT C) $\frac{1}{2} kT$ D) $\frac{3}{2} kT$
14. Period of oscillation of simple pendulum is
 A) Directly proportional to the length of the pendulum
 B) Directly proportional to the square root of length of the pendulum
 C) inversely proportional to the length of the pendulum
 D) inversely proportional to the square root of length of the pendulum.
15. According to Laplace correction sound travels in a gas as
 A) Adiabatic B) isothermal C) isobaric D) isochoric

II. Fill in the blanks by choosing appropriate answer given in the brackets for ALL the following questions: **5 × 1 = 5**

(intensity and frequency, parabola, total internal energy of the gas, Pascal's law, convection)

16. Trajectory of a projectile is _____
17. Gravitational force is required for _____
18. Hydraulic lift works on the basis of _____
19. Pressure of a gas at constant volume is proportional to _____
20. The loudness and pitch of a sound depends on _____

PART – B

III. Answer any FIVE of the following questions: **5 × 2 = 10**

21. Write any two limitations of dimensional analysis.
22. Draw the position time graph of a particle in (i) uniform +ve velocity (ii) uniform -ve velocity
23. What is impulsive force? Give example.
24. Under what condition work done by a force is (i) maximum (ii) minimum
25. Compare traslatory and rotatory motion.
26. Write the relation between g and G and explain the terms.
27. Covert 100°C to Fahrenheit scale and kelvin scale of temperature.
28. What is adiabatic process? Mention one example.
29. Define the term a) period b) frequency of periodic motion.

PART – C

IV. Answer any **FIVE** of the following questions:

5 × 3 = 15

30. State and explain triangular law of vector addition.
31. Write any three methods of reducing the friction.
32. Distinguish between elastic and inelastic collision.
33. A solid cylinder of mass 20kg rotates about its axis with angular speed 100rads^{-1} . The radius of the cylinder is 0.25m. What is the kinetic energy associated with the rotation of the cylinder?
34. Draw the typical stress-strain curve for a metal and explain the important features of it. Locate (i) yield point (ii) fracture point.
35. Distinguish between streamline and turbulent motion.
36. What is thermal radiation? Give any two properties of thermal radiation.
37. On what factors does mean free path of a gas molecule depend?
38. Distinguish between stationary and progressive waves.

PART – D

V. Answer any **THREE** of the following questions:

3 × 5 = 15

39. What is v-t graph? Derive $x = v_0 t + \frac{1}{2}at^2$ using v-t graph?
40. Define centripetal acceleration and obtain an expression for it.
41. Obtain the expression for loss in kinetic energy in case of completely inelastic collision in one dimension.
42. a) Define moment of inertia.
b) Mention the expression for the moment of inertia of a rod of mass M and length l about an axis perpendicular to it through its Centre.
43. a) What is Carnot engine?
b) Explain the different parts of a Carnot's heat engine.
44. What is a closed pipe? Discuss the modes of vibration of air column in a closed pipe.

VI. Answer any **TWO** of the following questions:

2 × 5 = 10

45. A cricket ball is thrown at a speed of 56ms^{-1} in a direction 30° above the horizontal. Calculate a) the maximum height, b) the time taken by the ball to return to the same level. And c) the distance from the thrower to the point where the ball returns to the same level. ($g = 9.8\text{ms}^{-2}$)
46. A bullet of mass 0.04kg moving with a speed of 90ms^{-1} enters a heavy wooden block and is stopped after a distance of 60cm. What is the average resistive force exerted by the block on the bullet? How far would the bullet have penetrated if the speed of the bullet had been 120ms^{-1}
47. The acceleration due to gravity on moon is 1.6ms^{-2} and its radius is 0.27 times the radius of the earth. Calculate the ratio of mass of the earth to the mass of the moon. The acceleration due to gravity on the earth's surface is 9.8ms^{-2} .
48. Calculate the rate of heat flow through a glass window 2m x 1.5m area and 3.2mm thick. The temperature of the inner and outer surfaces are 15°C and 14°C respectively.
[K for glass = $0.84\text{Wm}^{-1}\text{K}^{-1}$]

