COMMON HALF YEARLY EXAMINATION - 2022

Standard XI
PHYSICS

Reg.No. 0 1 1 2 1 6

Time: 3.00 hours   Marks: 70

Part - I

I Choose the correct answer   15 x 1 = 15

1. Which one of the following physical quantities cannot be represented by a scalar
   a) mass   b) length
   c) momentum   d) magnitude of acceleration

2. An athlete covers 3 rounds on a circular track of radius 50 m. Calculate the total displacement traveled by him
   a) 150 m   b) 53 m   c) zero   d) 16.6 m

3. The dimensional formula of Planck's Constant 'h' is
   a) ML^2T^{-1} b) ML^2T^{-3} c) MLT^{-1} d) ML^2T^{-3}

4. 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) $\frac{L}{\sqrt{2}}$

5. If the mass and radius of the earth are both doubled then the acceleration due to gravity 'g'
   a) remains same   b) $\frac{g}{2}$ c) 2g   d) 4g

6. If the internal energy of an ideal gas U and volume V are doubled then the pressure
   a) doubles   b) remains same   c) halves   d) quadruples

7. How many degrees of freedom for diatomic molecule at normal temperature?
   a) 3   b) 5   c) 7   d) 9

8. If a wire is stretched to double of its original length, then the strain in the wire is
   a) 1   b) 2   c) 3   d) 4

9. Excess pressure inside a soap bubble is
   a) $\frac{2T}{R}$ b) $\frac{6T}{R}$ c) $\frac{8T}{R}$ d) $\frac{4T}{R}$

10. In a simple harmonic oscillation the acceleration against displacement for one complete oscillation will be
    a) a straight line   b) an ellipse   c) a circle   d) a parabola

11. The efficiency of a heat engine working between the freezing point and boiling point of water is
    a) 6.25%   b) 20%   c) 26.8%   d) 12.5%

12. What is the value of triple point of water
    a) 273°C   b) 2731 K   c) 273.1 K   d) 273 K

13. Equation of travelling wave on a stretched string of linear density 5 g/m is y = 0.03 sin(450 t – 9x) where distance and time are measured in SI units. The tension in the string is
    a) 5 N   b) 12.5 N   c) 7.5 N   d) 10 N

14. A body of mass 1 kg is thrown upwards with a velocity 20 ms⁻¹. It momentarily comes to rest after attaining a height of 18 m. How much energy is lost due to air friction?
    a) 20 J   b) 30 J   c) 10 J   d) 40 J

15. Force acting on the particle moving with constant speed is
    a) always zero
    c) always non zero
    b) need not be zero
    d) cannot be concluded

Part - II

II. Answer any 6 questions: (Q.No.24 is compulsory)   6 x 2 = 12

16. Why moon has no atmosphere?
17. State Hooke's Law of elasticity.
18. Define molar specific heat capacity.
19. State Lami's theorem.
20. Check the correctness of the equation $\frac{1}{2}mv^2 = mgh$ using dimensional analysis method.
21. Write the difference between conservative and non-conservative forces.
22. Define time period of simple harmonic motion.
23. Define centre of mass.
24. Check whether the following vectors are orthogonal. $\vec{A} = 2\hat{i} + 3\hat{j}$, $\vec{B} = 4\hat{i} - 5\hat{j}$

Part - III

III. Answer any 6 questions: (Q.No.33 is compulsory)   6 x 3 = 18

25. State Kepler's three laws.
26. Derive the Kinetic equations of motion for constant acceleration.
27. A stone of mass 2kg is attached to a string of length 1 metre. The string can withstand maximum tension 200 N. What is the maximum speed that stone can have during the whirling motion?
28. State the laws of simple pendulum.
29. State and explain Work-Energy principle.
30. Write a note on triangulation method to measure larger distance
31. What are the applications of surface tension?
32. Distinguish between stable equilibrium and unstable equilibrium.
33. During a cyclic process a heat engine absorbs 500 J of heat from a hot reservoir. Does work and ejects an amount of heat 300 J into surroundings (cold reservoir) Calculate the efficiency of the heat engine.

Part - IV

IV. Answer all the questions.   5 x 5 = 25

34. a) Explain in detail Triangle Law of addition.   (OR)
    b) Write down the postulates of kinetic theory of gases.
35. a) What are the applications and limitations of dimensional analysis.   (OR)
    b) Explain how overtones are produced in a open organ pipe.
36. a) Arrive at an expression for elastic collision in one dimension and explain the case when the bodies have the same mass.   (OR)
    b) Define Escape speed and derive the expression for it.
37. a) State and prove parallel axis theorem.   (OR)
    b) Derive Meyer's relation for ideal gas.
38. a) Using free body diagram, find the expression for
       (i) acceleration (ii) speed of sliding objects   (OR)
    b) State and prove Bernoulli's theorem for a flow of incompressible, non-viscous and streamlined flow of fluid.

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