SIR .CV .RAMAN COACHING CENTRE – IDAPPADI,SALEM -2025
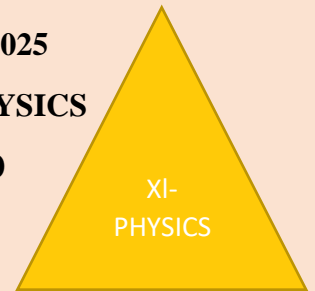
Xl- PHYSICS – PUBLIC MODEL QUESTION PAPER – 2025

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TOTAL MARK : 70 M , TIME : 3 HRS

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PHYSICS

SECTION – A (15 X 1 = 15 M)

Choose the correct best answer:

1.If the length and time period of an oscillating pendulum have errors of 1% and 3% respectively then the error in measurement of acceleration due to gravity is

          a) 7 %   b) 6 %   c) 1%   d) zero

2. If an object is thrown vertically up with the initial speed u from the ground, then the time taken by the object to return back to ground is

(a) $\dfrac{u^2}{2g}$ (b) $\dfrac{u^2}{g}$ (c) $\dfrac{u}{2g}$ (d) $\dfrac{2u}{g}$

3. Choose appropriate free body diagram for the particle experiencing net acceleration along negative y direction. (Each arrow mark represents the force acting on the system).
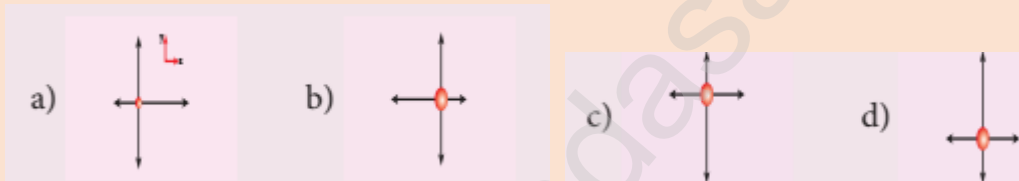
4. A body of mass 4 m is lying in xy-plane at rest. It suddenly explodes into three pieces. Two pieces each of mass m move perpendicular to each other with equal speed v. The total kinetic energy generated due to explosion is

(a) mv^2 (b) $\dfrac{3}{2}mv^2$ (c) $2mv^2$ (d) $4mv^2$

5. The speed of a solid sphere after rolling down from rest without sliding on aninclined plane of vertical height h is,

(a) $\sqrt{\dfrac{4}{3}gh}$ (b) $\sqrt{\dfrac{10}{7}gh}$ (c) $\sqrt{2gh}$ (d) $\sqrt{\dfrac{1}{2}gh}$

6. A student tunes his guitar by striking a 120 Hertz with a tuning fork, and simultaneously plays the 4th string on his guitar. By keen observation, he hears the amplitude of the combined sound oscillating thrice per second. Which of the following frequencies is the most likely the frequency of the 4th string on his guitar?

          a) 117   b) 110   c) 320   d) 520

7. For a given gas molecule at a fixed temperature, the area under the Maxwell-Boltzmann distribution curve is equal to

(a) $\dfrac{PV}{kT}$ (b) $\dfrac{kT}{PV}$ (c) $\dfrac{P}{NkT}$ (d) PV

8. When a cycle tyre suddenly bursts, the air inside the tyre expands. This process is
a) isothermal   b) adiabatic   c) isobaric   d) isochoric

9. The following four wires are made of the same material. Which of these will have the largest extension when the same tension is applied?
(a) length = 200 cm, diameter = 0.5 mm   (b) length= 200 cm, diameter = 1 mm
(c) length = 200 cm, diameter = 2 mm   (d) length= 200 cm, diameter = 3 m

10. The magnitude of the Sun's gravitational field as experienced by Earth is
(a) same over the year
(b) decreases in the month of January and increases in the month of July
(c) decreases in the month of July and increases in the month of January
(d) increases during day time and decreases during night time

11. 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 the surroundings (cold reservoir). Calculate the efficiency of the heat engine
a) 45%   b) 20%,   c) 60%   d) 40%

12. The *amplitude is minimum or zero, called Is*
a) nodes   b) antinodes   c) both a and b   d) none of the above

13. In the following, what are the quantities which that are conserved?
a) Linear momentum of planet b) Angular momentum of planet
c) Total energy of planet   d) Potential energy of a planet

14. Consider two trains A and B moving along parallel tracks with the same velocity in the same direction. Let the velocity of each train be 50 km h-1 due east. Calculate the relative velocities of the trains
a) 5   b) -5   c) 10   d) 0

15. Lami's theorem states that if an object is in equilibrium under the concurrent forces, then the ratio of each force with the sine of corresponding …… angle is same.
 a) opposite   b) same   c) zero   d) none of the above

SECTION – B (6 X 2 = 12 M)
Answer any six questions .compulsory Q.No : 24.
16. State conservation of angular momentum
17. What are inertial frames?
18. What is non uniform circular motion?
19. Define AU
20. An unknown planet orbits the Sun with distance twice the semi major axis distance of the Earth's orbit. If the Earth's time period is T1, what is the time period of this unknown planet
21. How is surface tension related to surface energy?
22. State Stefan-Boltzmann law.
23. Write the expression for rms speed, average speed and most probable speed of a gas molecule
24. Consider the following function which among the above function can be characterized as a wave ?

(a) $y = x^2 + 2\alpha t x$ (b) $y = (x + vt)^2$

SECTION – C (6 X 3 = 18M)
Answer any six questions .compulsory Q.No : 33.
25. Discuss the important features of the law of gravitation
26. State and prove Pascal's law in fluids
27. Discuss the ideal gas laws.

28.Write short notes on intensity and loudness.

29.Write short notes on the oscillations of liquid column in U-tube

30.Briefly explain 'rolling friction'.

31.Arrive at an expression for power and velocity

32.A train was moving at the rate of 54 km h-1 when brakes were applied. It came to rest within a distance of 225 m. Calculate the retardation produced in the train

33Two particles P and Q of mass 1kg and 3 kg respectively start moving towards each other from rest under mutual attraction. What is the velocity of their centre of mass?

SECTION – D (5 X 5 = 25 M)

Answer all questions :

34 a) Discuss rolling on inclined plane and arrive at the expression for the acceleration.

(or)

b) Explain in detail the four different types of oscillations.

35 a) Calculate the centripetal acceleration of Moon towards the Earth.

(or)

b) Explain in detail the Maxwell Boltzmann distribution function

36 a) Derive the equations of motion for a particle (a) falling vertically (b) projected vertically

(or)

b) Derive the expression for Carnot engine efficiency.

37 a) Derive the expression for the terminal velocity of a sphere moving in a high viscous fluid using stokes force

(or)

b) Write short notes on the following. a) Unit b) Rounding – off c) Dimensionless quantities

38 a) Prove that at points near the surface of the Earth, the gravitational potential energy of the object is $U = \mathrm{m}gh$

(or)

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

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