SAMPLE QUESTION PAPER

Reg No : ....
Name   : ....

FIRST YEAR HIGHER SECONDARY EXAMINATION, MARCH 2023

Part – III   Time : 2 Hrs
PHYSICS   Cool-off time : 15 Minutes
Maximum : 60 Scores

General Instructions to Students

- There is a 'cool-off time' of 15 minutes in addition to maximum writing time.

- Use cool-off time to get familiar with questions and to plan your answers.

- Read the instructions carefully.

- Read questions carefully before answering.

- Calculations, figures, graphs should be shown in the answer sheet itself.

- Give equations wherever necessary.

- Electronic devices except non-programmable calculators are not allowed in the Examination Hall.

PART I

Answer any 5 questions from 1 to 7. Each carries 1 score.   **(5 × 1 = 5)**

1. Light year is the unit of----------

2. Slope of position -time graph of uniform motion gives------
   (1)Acceleration (2) Velocity (3) Displacement (4) Force

3. When a moving bus suddenly stops passenger tends to fall forward this is due to---------

4. Escape velocity from the surface of earth is-----
   a)11.2Km/hr   (b)11.2km/s   (c) 11.2m/hr   (d) 2.32Km/hr

5. Working of hydraulic lift is based on which law?

6. 98°F =........... K

7. What will be time period of a simple pendulum inside a lift when a lift moves upward.
   (a) increases   (b) decreases   (c) no change.

PART II

Answer any 5 questions from 8 to 14. Each carries 2 scores.

8. A car travells from A-B at a speed of 40 km/hr and returns to A at a speed of 60 km/hr. Find the average velocity?

9. If |A+B|=|A-B| , Find the angle between A and B.

10. Derive an expression for force based on Newton's second law of motion?

11. State and prove work-energy theorem?

12. State law of equipartition of energy?

13. Differentiate between extensive and intensive quantities. Give one example each?

14. Write an expression for torque. Handles of doors are fixed at maximum distance from hinges. Give reason?

PART III

Answer any 6 questions from 15 to 21. Each carries 3 scores.

15. State principle of homogeneity. Check the correctness of the equation **F=mv²/r** where F is the force exerted, **v** is the velocity of the body and **r** is the radius of circular path.

16. Derive the relation torque and angular momentum.

17. A body is placed at a height equal to half the radius of earth. Find the acceleration due to gravity at this place.

18. A steel wire of length 1.5m diameter 25 cm is loaded with a force of 98 N. The increase in the length of wire is 1.5×10^4 m. Calculate the Young's modulus of the material.

19. Obtain an expression for excess pressure inside a liquid drop.

20. Prove that co- efficient of linear expansion is twice that of coefficient of area expansion.

21. Obtain the relation for time period of oscillation of a simple pendulum.

PART IV

Answer any 3 questions from 22 to 25. Each carries 4 scores.

22. Prove the law of conservation of mechanical energy in the case of a freely falling body.

23. Explain the four operations in a Carnot's Cycle. Also draw its P-V diagram.

24. Plot the first and second mode of vibration in a stretched string.Prove the ratio of frequencies in first, second and third mode are in the ratio 1:2:3

25. Derive the following equations of motions for a body moving with uniform acceleration.

    (a) v = u + at   (b) s = ut + ½ at²

PART V

Answer any 3 questions from 26 to 29,Each carries 5 scores.

26. The value of acceleration due to gravity is same for all objects at a given place.

    (a) Derive an equation for the acceleration due to gravity in terms of radius R and mass M of the earth.   [2]

(b) Obtain a mathematical expression for the variation of acceleration due to gravity at a height "h" above the surface of earth. [3]

27. A vehicle of mass 'm' is moving on a banked road of radius 'r'.

(a) Obtain an expression for maximum safe speed of the vehicle on the banked road. [3]

(b) A circular road of radius 300m is banked at an angle of 15º. If the coefficient of friction between the wheels of a car and the road is 0.2. What is the optimum speed of the car. [2]

28. A projectile is any body that is given an initial velocity and then follows a path determined entirely by the effects of gravitational acceleration and air resistance.

(a) Derive an expression for maximum height 'H' and time of flight 'T'. [3]

(b) a base ball leaves a bat with initial speed 30m/s at an angle of 53º.Find the position of ball when t=2s. [2]

29. In case of fluids, law of conservation of energy can be explained with Bernoulli's Principle.
State and prove Bernoulli's theorem with the aid of a neat diagram

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