FY-401

Reg. No. ……

Name ……..

FIRST YEAR HIGHER SECONDARY EXAMINATION, MARCH — 2024

Part Ill

PHYSICS

Maximum : 60 Scores

Time : 2 Hours

Cool-off time : 15 Minutes

General Instructions to Candidate

- **There is a 'Cool-offtime' of 15 minutes in addition to the writing time.**
- **Use the `Cool-off time' to get familiar with questions and to plan your answers.**
- **Read questions carefully before answering.**
- **Read the instructions carefully.**
- **Calculations, figures and 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.**

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

1 The dimensional formula for gravitational constant

(a) MUT^{-2} (b) ML^2T

(c) $m^{-1}L^3T^2$ (d) $^1L^2T^{-2}$

2. The moment of inertia of a disc about an axis passing through the centre and perpendicular to its plane.

(a) MR^2 (b) $\frac{1}{2}MR^2$

(c) $\frac{2}{3}MR^2$ (d) $\frac{2}{5}MR^2$

3. The excess pressure inside a soap bubble is

(a) 0 (b) $\frac{S}{R}$

(c) $\frac{2S}{R}$ (d) $\frac{4S}{R}$

4. "The heat given to a system is used to increase the internal energy and doing external work". This is

(a) Zeroth law in thermodynamics (b) First law in thermodynamics

(c) Second law in thermodynamics (d) Newton's third law in motion

5. According to kinetic theory of gases "The collision between gas molecules are elastic". The statement is

True/False

6. The condition for simple harmonic motion is __

7. What are beats ?

Answer any 5 questions from 8 to 14. Each carries 2 scores. **(5 x 2 =10)**

8. Write two uses of dimensional analysis.

9. State the number of significant figures in (i) 6.320 **J** (ii) 2370 g cm^{-3}.

10. Derive the relation v u 4 at.

11. Define power, write its unit and dimension.

12 Explain anomalous behaviour of water related to thermal expansion.

13. State Newton's law of cooling.

14. Write the C, and C values of one mole of diatomic gas.

Answer any 6 questions from 15 to 21. Each carries 3 scores. **(6 x 3 = 18)**

15. State and explain parallelogram law of vector addition.

16. State Newton's 2" law of motion and show F = ma.

17. State Kepler's laws of planetary motion.

18. Explain Young's modulus, write its unit.

19. Explain the working of a hydraulic lift.

20. Write the expression for kinetic energy and potential energy of a body executing SHM and draw their variations in a graph.

21. Explain the speed of longitudinal wave and write the value of speed of sound at 0 °C after Laplace correction.

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

(a) State work-energy theorem.

(b) What is a collision ? Explain its different types.

23 (a) State and explain :

(i) Torque

Angular momentum (PA + 11/2 = 3)

(h) Write the relation between torque and angular momentum. (I)

24. (a) What do you mean by escape speed ?

(b) Derive the expression for escape speed of a body from the earth.

25. (a) What are isothermal and adiabatic process ? **(2)**

(h) Derive the expression for work done in an isothermal process. **(2)**

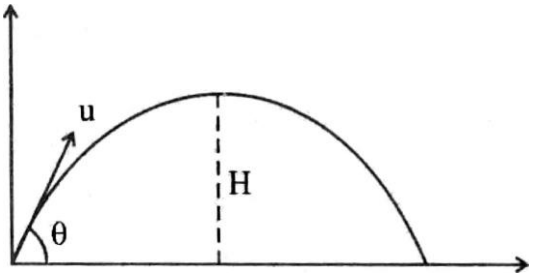
Answer any 3 questions from 26 to 29. Each carries 5 scores. **(3 x 5 = 15)**

26. (a) Draw velocity-time graph for uniformly accelerated motion. (1)

(b) Write the significance of *v-t* graph. **(2)**

(c) Derive the equation $s = ut + \frac{1}{2} at^2$ from the *v-t* graph. **(2)**

27. (a) Figure shows the path of a projectile motion of a body. Derive the expression for maximum height attained by the body.



(b) A ball is thrown at a speed of 28 ms^{-1} in a direction 30^0 from the horizontal range. Calculate its horizontal range. **(2)**

(c) At what angle of projection is the horizontal range maximum ? **(1)**

28. (a) State and prove the law of conservation of linear momentum. **(2)**

(b) What is friction ? Mention its different types. **(2)**

(c) At equilibrium the net force acting on a body is (1)

29. (a) What is stream line flow ? **(1)**

(b) State Bernoulli's principle. **(2)**

(c) What is viscous force and explain coefficient of viscosity. **(2)**