FY-424

Reg. No. : .....

Name : .....

FIRST YEAR HIGHER SECONDARY EXAMINATION, MARCH – 2024

Part – III

PHYSICS

Maximum : 60 Scores

Time : 2 Hours

Cool-off time : 15 Minutes

General Instructions to Candidates :

- There is a 'Cool-off time' 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.
- Malayalam version of the questions is also provided.
- Give equations wherever necessary.
- Electronic devices except non-programmable calculators are not allowed in the Examination Hall.

വിദ്യാർത്ഥികൾക്കുള്ള പൊതുനിർദ്ദേശങ്ങൾ :

- നിർദ്ദിഷ്ട സമയത്തിന് പുറമെ 15 മിനിറ്റ് 'കൂൾ ഓഫ് ടൈം' ഉണ്ടായിരിക്കും.
- 'കൂൾ ഓഫ് ടൈം' ചോദ്യങ്ങൾ പരിചയപ്പെടാനും ഉത്തരങ്ങൾ ആസൂത്രണം ചെയ്യാനും ഉപയോഗിക്കുക.
- ഉത്തരങ്ങൾ എഴുതുന്നതിന് മുമ്പ് ചോദ്യങ്ങൾ ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- നിർദ്ദേശങ്ങൾ മുഴുവനും ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- കണക്ക് കൂട്ടലുകൾ, ചിത്രങ്ങൾ, ഗ്രാഫുകൾ, എന്നിവ ഉത്തരപേപ്പറിൽ തന്നെ ഉണ്ടായിരിക്കണം.
- ചോദ്യങ്ങൾ മലയാളത്തിലും നല്കിയിട്ടുണ്ട്.
- ആവശ്യമുള്ള സ്ഥലത്ത് സമവാക്യങ്ങൾ കൊടുക്കണം.
- പ്രോഗ്രാമുകൾ ചെയ്യാനാകാത്ത കാൽക്കുലേറ്ററുകൾ ഒഴികെയുള്ള ഒരു ഇലക്ട്രോണിക് ഉപകരണവും പരീക്ഷാഹാളിൽ ഉപയോഗിക്കുവാൻ പാടില്ല.

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

1. The dimensional formula for gravitational constant

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

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

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 × 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 $v = u + at$.

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_v and C_p values of one mole of diatomic gas.

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

15. State and explain parallelogram law of vector addition.

16. State Newton's 2nd 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. **(3 × 4 = 12)**

22. (a) State work-energy theorem. **(2)**

    (b) What is a collision ? Explain its different types. **(2)**

23. (a) State and explain :

    (i) Torque

    (ii) Angular momentum **(1½ + 1½ = 3)**

    (b) Write the relation between torque and angular momentum. **(1)**

24. (a) What do you mean by escape speed ? (1)

(b) Derive the expression for escape speed of a body from the earth. (3)

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

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

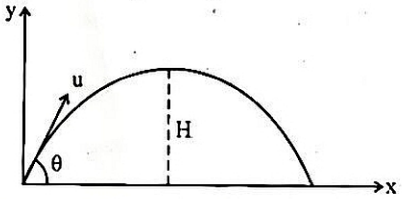
Answer any 3 questions from 26 to 29. Each carries 5 scores. **(3 × 5 = 15)**

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. (2)



(b) A ball is thrown at a speed of 28 ms^{-1} in a direction 30° 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)
