0119

SET -

Total No. of Questions - **33**

Total No. of Printed Pages - **3**

Regd. No.

Part - III

PHYSICS, PAPER - I

(English Version)

MODEL PAPER

(For Academic Year 2021-22 only)

Time : **3 Hours**   *Max. Marks :* **60**

SECTION - A   **10 × 2 = 20**

Note:(i)   Answer **ANY TEN** Questions

(ii)   Each Question carries **TWO** marks

(iii)   All are very short answer type questions.

1.   When does a real gas behave like an ideal gas?

2.   The absolute temperature of a gas is incresed 3 times. What will be the increase in rms velocity of the gas molecule?

3.   Two thermally insulated vessels 1 and 2 of volumes V_1 and V_2 are joined with a valve and filled with air at temperatures (T_1, T_2) and presures (P_1, P_2) reaspectively. If the valve joining the two vessels is opened, what will be the temperture inside the vessels at equilibrium.

4.   When water flows through a pipe, which of the layers moves fastest and slowest ?

5.   Is it necessary that a mass should be present at the centre of mass of any system?

6. We cannot open or close the door by applying force at the hinges. Why?

7. Why should a helicopter necessarily have two propellers?

8. If a bomb at rest explodes into two pieces, the pieces must travel in opposite directions. Explain.

9. A horse has to pull harder during the start of the motion than later. Explain.

10. $\vec{A} = \vec{i} + \vec{j}$. What is the angle between the vector and x-axis?

11. If P =2i + 4j + 14k and Q= 4i + 4j + 10k find the magnitude of **P + Q**.

12. Distinguish between accuracy and precision.

13. Distinguish between fundamental units and derived units.

14. Express unified atomic mass unit in kg.

15. What are the fundamental forces in nature?

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SECTION - B   **6 × 4 = 24**

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Note: (i) Answer **ANY SIX** questions.
(ii) Each question carries **FOUR** marks.
(iii) All are of short answer type questions.

16. A particle moves in a staright line with uniform acceleration. Its velocity at time t=0 is v_1 and at time t=t is v_2. The average velocity of the particle in this time interval is $(v_1+v_2)/2$. Is this correct? Substantiate your answer.

17. A man runs across the roof of a tall building and jumps horizontally on to the (lower)roof of an adjacent building. If his speed is 9 m s^{-1} and the horizontal distance between the buildings is 10 m and the height difference between the roofs is 9 m, will he be able to land on the next building? (take g=10 m s^{-2})

18. Show that the trajectory of an object thrown at certain angle with the horizontal is a parabola.

19. If $\left|\vec{a}+\vec{b}\right|=\left|\vec{a}-\vec{b}\right|$ prove that the angle between $\vec{a}$ and $\vec{b}$ is 90°.

20. Show that the maximum height and range of a projectile are $\dfrac{U^2\sin^2\theta}{2g}$ and $\dfrac{U^2\sin 2\theta}{g}$ respectively where the terms have their regular meanings.

21. Explain the terms limiting friction, dynamic friction and rolling friction.

22. Mention the methods used to decrease friction.

23. Define vector product. Explain the properties of a vector product with two examples.

24. What is escape velocity? Obtain an expression for it.

25. What is Geo-Stationary satellite? Mention its uses.

26. Describe the behaviour of a wire under gradually increasing load.

27. The roof of buildings are often painted white during summer. Why?

28. Obtain an expression for the work done by an ideal gas during isothermal change.

29. State and explain first law of thermodynamics.

SECTION - C   2 × 8 = 16

Note: (i)   Answer any **ANY TWO** questions.

(ii) Each question carries **EIGHT** marks.

(iii) All are long answer type questions.

30. State and explain Newton's law of cooling. State the conditions under which Newton's law of cooling is applicable. A body cools down from 60°C to 50°C in 5 minutes and to 40°C in another 8 minutes. Find the temperature of the surroundings.

31. Define simple harmonic motion. Show that the motion of (point) projection of a particle performing uniform circular motion, on any diameter, is simple harmonic.

32. What are collisions? Explain the possible types of collisions? Develop the theory of one dimensional elastic collision.

33. State and prove law of conservation of energy in case of a freely falling body.

    A pump is required to lift 600 kg of water per minute from a well 25 m deep and to eject it with a speed of 50 ms^{-1}. Calculate the power required to perform the above task?

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