

Total No. of Questions - 21

Total No. of Printed Pages - 2

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No.

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Part - III

PHYSICS, Paper - I
(English Version)

Time : 3 hours

Max. Marks : 60

SECTION A

10 × 2 = 20

Note : i) Answer **all** questions.ii) Each question carries **two** marks.iii) All are **very short answer** type questions.

1. What is the discovery made by C. V. Raman?
2. How can systematic errors be minimized or eliminated?
3. $A = \vec{i} + \vec{j}$. What is the angle between a vector and the X-axis?
4. What is inertia? What gives the measure of inertia?
5. If the diameter of a soap bubble is 10 mm and its surface tension is 0.04 N/m, find the excess pressure inside the bubble.
6. Why are drops and bubbles spherical?
7. What are the units and dimensions of a specific gas constant?
8. Ventilators are provided in rooms just below the roof. Why?
9. When does a real gas behave like an ideal gas?
10. State Dalton's law of partial pressures.

SECTION B

Note : i) Answer **any six** questions.

6 × 4 = 24

ii) Each question carries **four** marks.

iii) All are **short answer** type questions.

11. State the parallelogram law of vectors. Derive an expression for the magnitude and direction of the resultant vector.

12. Show that the maximum height reached by a projectile launched at an angle of 45° is one quarter of the range.

13. Mention the methods used to decrease friction.

14. Find the torque of a force $7\vec{i} + 3\vec{j} - 5\vec{k}$ about the origin. The force acts on a particle whose position vector is $\vec{i} - \vec{j} + \vec{k}$.

15. Distinguish between the center of mass and the center of gravity.

16. What is orbital velocity? Obtain an expression for it.

17. Define strain energy and derive the equation for the same.

18. In what way is the anomalous behavior of water advantageous to an aquatic animal?

SECTION C

Note : i) Answer **any two** questions.

2 × 8 = 16

ii) Each question carries **eight** marks.

iii) All are **long answer** type questions.

19. Develop the notions of work and kinetic energy and show that they lead to the work-energy theorem.

A machine-gun fires 360 bullets per minute and each bullet travels with a velocity of 600 m/sec. If the mass of each bullet is 5gm, find the power of the machine-gun.

20. Show that the motion of a simple pendulum is simple harmonic and hence derive an equation for its time period. What is a seconds pendulum?

21. Explain reversible and irreversible processes. Describe the working of a Carnot engine. Obtain an expression for the efficiency.