PART A

I.   **Answer the following.**   **10 × 1 = 10**
1. Who proposed wave theory of light?
2. What is null vector?
3. Can potential energy be negative?
4. Define radius of gyration.
5. What is the weight of a body at the centre of the earth?
6. Give an importance of Reynold's number.
7. What is the principle behind the uplift of an aeroplane?
8. Mention the of degrees of freedom for a triatomic gas molecule of linear arrangement.
9. How does the speed of sound in gas vary with the pressure?
10. Write the relation between path difference and phase difference.

PART B

II.   **Answer any FIVE of the following questions.**   **5 × 2 = 10**
11. Name any two fundamental forces in nature.
12. Mention any two limitations of dimensional analysis.
13. Define dot product of two vectors. When it is maximum?
14. Mention any two advantages of friction.
15. Define average velocity and instantaneous velocity.
16. State the first law of thermodynamics and mention its significance.
17. Write the relation between 'g' and 'G' and explain the terms.
18. Mention an expression for the period of oscillation of a spring and explain the terms.

PART C

III.   **Answer any FIVE of the following questions.**   **5 × 3 = 15**
19. Obtain an expression for maximum height attained by a projectile.
20. Using Newton's second law of motion , arrive at F = ma
21. Prove work – energy theorem for a constant force.
22. Mention the three types of moduli of elasticity.
23. State and explain Bernoulli's principle.
24. What is thermal conductivity? Write the expression and mention its S I unit.
25. Write any three postulates of kinetic theory of gasses.
26. Derive the Newton's formula for velocity of sound in air.

PART D

IV.   **Answer any TWO of the following questions**   **2 × 5 = 10**
27. What is v –t graph? Derive an expression for $s = ut + ½ at^2$
28. State the law of conservation of mechanical energy. Illustrate in the case of freely falling body.
29. Define angular momentum and torque. Derive the relation between them.

V.   **Answer any TWO of the following questions.**   **2 × 5 = 10**
30. State and explain Kepler's laws of planetary motion.
31. State Newton's law of cooling and hence derive an expression for it.
32. Derive an expression for time period of simple pendulum.

VI.   Answer any THREE of the following questions.   3 × 5 = 15

33. A body is thrown vertically up from the top of a building with a velocity of 10 ms^{-1}. It reaches the ground in 5 s. Find the height of the building and the velocity with which the body reaches the ground. (Given g = 10 m/s^2).

34. A bullet of mass 0.015kg strikes a metal plate of thickness 10cm with a velocity of 400m/s and emerge from it with a velocity of 260m/s. Find the average resistance offered by the plate to the motion of bullet.

35. A solid cylinder of mass 20 kg rotates about its axis with angular speed 100 rad s^{-1}.The radius of the cylinder is 0.25 m. What is the kinetic energy associated with the rotation of the cylinder? What is the magnitude of angular momentum of the cylinder about its axis?

36. A Carnot engine has an efficiency of 0.3, when the temperature of the sink is 350K. Find the change in temperature of the source when the efficiency becomes 0.5.

37. A train is moving at speed of 72 kmph towards a station, is sounding a whistle of frequency 600Hz. What are the apparent frequencies of the whistle as heard by a man on the plot form when the train a) approaches him b)recedes from him?(speed of sound in air = 340m/s)

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