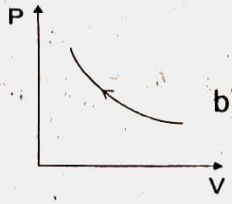
HALF-YEARLY EXAMINATION - 2023

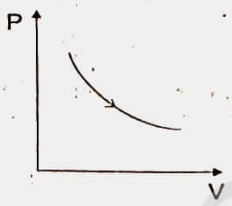
STD - XI | **PHYSICS** | **MARKS : 70**

TIME : 3.00 Hrs

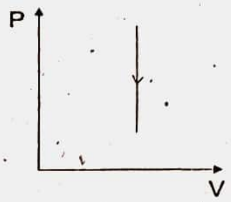
Part - I

I. Answer all the questions. **15 x 1 = 15**

1. Which one of the following is a scalar quantity?
   a) Speed b) Velocity c) Displacement d) Linear momentum
2. The length of a body is measured as 3.51m. If the accuracy is 0.01m, then the percentage error in the measurement is
   a) 0.035% b) 351% c) 1% d) 0.28%
3. A spring of force constant K is cut into two pieces such that the length of one piece is double the length of the other. Then the longer piece will have a force constant of
   a) 6K b) 2 / 3 K c) 3 / 2 K d) 3K
4. When a car takes a sudden left turn on a curved road, passengers are pushed towards the right due to
   a) absence of inertia b) inertia of direction c) inertia of motion d) inertia of rest
5. Identify the unit vector in the following :
   a) $\frac{\hat{i}+\hat{j}}{\sqrt{2}}$ b) $\hat{i}+\hat{j}$ c) $\frac{\hat{i}}{\sqrt{2}}$ d) $\hat{k}-\frac{\hat{j}}{\sqrt{2}}$
6. An air column in a pipe which is closed at one end is in resonance with the vibrating body of frequency 83 Hz. Then the length of the air column is : (velocity of sound in air = $332 ms^{-1}$)
   a) 1.5 m b) 0.5 m c) 20 m d) 1.0 m
7. Which one of the following p-v diagrams corresponds to isobaric compression?
   a) 

   b) 

   c) 

   d) 

8. If the distance between the Earth and Sun is twice its present value, the number of days in a year will be
   a) 730 b) 1032 c) 64.5 d) 182.5
9. Moment of inertia of a solid cylinder of Mass M, length l and radius r about its own axis is
   a) $M\left[\frac{r^2}{2}+\frac{l^2}{12}\right]$ b) Mr^2 c) $\frac{1}{4}Mr^2$ d) $\frac{1}{2}Mr^2$
10. Human adible wavelength range (velocity of sound in air = 340 ms^{-1}) is :
    a) 17m to 170m b) 0.17m to 17m c) 0.017m to 17m d) 1.7m to 17m
11. A body of mass 20kg, moving with a speed ms^{-1} on a horizontal smooth surface
    a) 10m b) 50m c) 5m d) 20m
12. The dimensional formula for momement of Inertia.
    a) $ML^{-1}T^{-1}$ b) ML^2T^{-2} c) MLT^2 d) ML^2
13. THe ratio between the rms speed and most probable speed of gas molecules at a given temperature is
    a) $2\sqrt{2}:\sqrt{1}$ b) $\sqrt{3}:\sqrt{2}$ c) $\sqrt{2}:\sqrt{3}$ d) $\sqrt{1}:2\sqrt{2}$
14. rms speed of hydrogen molecule at 27^0C
    a) 193 kms^{-1} b) 1.93 kms^{-1} c) 19.3 kms^{-1} d) 0.193 kms^{-1}
15. The efficienry of heat engine working between the freezing point and boiling point of
    a) 12.5% b) 6.25% c) 20% d) 26.8%

PART - II

Answer any Six Questions. Q.No.24 is compulsory **6 x 2 = 12**

16. Check the correctness of the equation $\frac{1}{2}mp^2 = mgh$ using dimensional analysis.
17. Define distance and displacement.

18. Why there is no lunar eclipse and solar eclipse every month.
19. State the law of conservation of angular momentum.
20. What is coeffecient of restitution?
21. During a cyclic process, a heat engine absorbs 500 J heat from a hot reservoir, does work and ejects an amount of heat 300 J into the surroundings (cold reservoir). Calculate the efficiency of the heat engine.
22. Why there is no hydrogen in the earth's atmosphere?
23. Write down the factors affecting velocity of sound in gases.
24. If the length of the simple pendulum is increased by 44% from its original length, calculate the percentage increase in time period of the pendulum.

PART - III

Answer any Six Questions. Q.No.33 is compulsory **6 x 3 = 18**

25. Explain RADAR pulse method for determining large distances.
26. An object as thrown with initial speed $5ms^{-1}$ with an angle of 30^0. Calculate the maximum I weight.
27. When a cricket player catches the ball, he pulls his hands in the direction of the ball's motion. Why?
28. State Kepler's three laws.
29. Write the differences between transverse and longitudinal waves.
30. We use straw to suck soft drinks. Why?
31. Explain Resonance. Give an example.
32. What are the conditions for reversible process?
33. A farce of $\left(4\hat{i}-3\hat{j}+5\hat{k}\right)N$ is applied at paint whose position vector is $\left(7\hat{i}+4\hat{j}-2\hat{k}\right)M$. Find the torque of force about the origin.

PART - IV

Answer all the questions. **5 x 5 = 25**

34. a) Derive the expression for centripetal acceleration. (OR)
    b) State and explain work energy theotem. Mention any three examples for it.
35. a) What do you mean by propagation of errors? Explain propagation of errors in division of two quantities. (OR)
    b) Derice the work done in an adiabatic process.
36. a) i) Derive the expression for the variation of acceleration due to gravity (g) with depth from the surface of the earth (d)
    ii) Find the ratio of the acceleration due to gravity at a height R/2 from the surface of the earth to the value at a depth R/2 from the surface of the earth (R - radius of the earth) (OR)
37. a) Derive the expression for moment of inertia of a thin uniform rod about an axis passing through the centre and perpendicular to his length. (OR)
    b) Explain in detail the four different types of oscillations.
38. a) i) Determine the height of an accessible object using, Triangulation method.
    ii) From a point on the ground, the top of a tree is seen to have an angle of elevation 60°. The distance between the tree and a point is 50 m. Calculate the height of the tree? (OR)
    b) Derive the expression for the terminal velocity of a sphere moving in a high viscous fluid, using stokes formula.