COMMON HALF YEARLY EXAMINATION - 2024

Time: 3.00 hrs.

Standard - XI

PHYSICS

Reg.No. ☐☐☐☐☐☐

Marks:70

I. Answer all the questions.

PART - I

15×1=15

1. An air column in a pipe which is closed at one end, will be in resonance with the vibrating body of frequency 83Hz. Then the length of the air column is
   a) 1.5m   b) 0.5m   c) 1.0m   d) 2.0m

2. A transvere wave moves from a medium A to a medium b. In medium A, the velocity of the transvere wave is 500ms-1 and the wavelength is 5m. The frequency and the wavelength of the wave in medium B when its velocity is 600ms^{-1},respectively are
   a) 120Hz and 5m   b) 120Hzand 6m   c) 100Hz and 5m   d) 100 Hz and 6m

3. If the force is proportional to square of velocity , then the dimension of proportionality constant is
   a) $[MLT^0]$ b) $[MLT^1]$ c) $[ML^{-2}T]$ d) $[ML^{-1}T^0]$

4. In a simple harmonic oscillation, the acceleration aganist displacement for one complete oscillation will be
   a) an ellipse   b) a circle   c) a parabola   d) a straight line

5. A pendulum is hung in avery high building oscillates to and fro motion feely like a simple harmonic oscillator. If the acceleration of the bob is 16ms^{-2} at a dustabce if 4 m from the mean position, then the time period is
   a) 2s   b) 1s   c) 2πs   d) πs

6. If an object is dropped from the top of a building and it reaches the ground at t = 4s, then the height of the building is (ignoring air resistance) (g= 9.8ms^{-2})
   a) 77.3m   b) 78.4m   c) 80.5m   d) 79.2m

7. The average translational kinetic energy of gas molecules depends on
   a) number of moles and T   b) only on T
   c) P and T   d) P only

8. If the temperature and pressure of a gas is doubled the mean free path of the gas molecules
   a) remains same   b) doubled   c) tripled   d) quadrapoled

9. When the object is moving at constant velocity on the rough surface.
   a) net force on the object is zero   b) on force acts on the object
   c) only external force acts on the object d) only kinetic friction acts on the object

10. In an isochoric process, we have
    a) W = 0   b) Q = 0   c) $\Delta U = 0$ d) $\Delta T = 0$

11. The efficiency of a heat engine working between the freezing point and boiling point of water is
    a) 6.25%   b) 20%   c) 26.8%   d) 12.5%

12. What is the minimum velocity with which a body of mass m must enter a vertical loop of radius R so that it can complete the loop?
    a) $\sqrt{2gR}$ b) $\sqrt{3gR}$ c) $\sqrt{5gR}$ d) $\sqrt{gR}$

13. Two wires are made of the same material and have the same volume.The area of cross sections of the first and the second wires are A and 2A respectively.if the length of the first wire is increased by $\Delta 1$ an applying a force F, how much force is needed to stretch the second wire by the same amount?
    a)   b) 4F   c) 8F   d) 16F

14. A particle undergoes uniform circular motion. The angular momentum of the particle remain conserved about,
 a) the centre point of the circle b) any point inside the circle
 c) the point on the circumference of the circle d) any point outside the circle

15. The linear momentum and position vector of the plan is perpendicular to each other at
 a) perihelion and aphelion b) at all points c) only at perihelion d) no point

II. Answer any 6 questions, question No.23 is compulsory. 6×2=12

16. Define centre of mass.
17. State Newton's Universal law of gravitation.
18. Define power.
19. Define poisson's ratio.
20. Define one newton.
21. Define molar specific heat capacity.
22. Define a radian
23. Explain resonance. Give an example.
24. Why moon has no atmosphere?

III. Answer any 6 questions. question No.28 is compulsory. 6×3=18

25. Write down the factors affecting velocity of sound in gases.
26. What is the difference between sliding and slipping?
27. State the laws of simple pendulum?
28. Explain the characteristics of elastic and inelastic collision.
29. Deduce Boyle's law based on kinetic theory.
30. Under what condition will a car skid on a leveled circular road?
31. Define the coefficient of performance.
32. State Archimedes principle.
33. Define gravitational potential.

IV. Answer all the question: 5×5=25

34. a) Explain in detail the various types of errors. **(OR)**
 b) Derive the equation of motion, range and maximum height reached by the particle thrown at an oblique angle θ with respect to the horizontal direction.

35. a) Briefly explain the difference travelling waves and standing waves. **(OR)**
 b) Arrive at an expression for elastic collision in one dimension and discuss various cases.

36. a) Explain in detail the four different types of oscillations. **(OR)**
 b) Explain the similarities and differences of centripetal and centrifugal forces.

37. a) Write down the postulates of kinetic theory of gases. **(OR)**
 b) Explain in detail the working of a refrigerator.

38. a) State and prove Bernoulli's theorem for a flow of incompressible, non-viscous, and streamlined flow of fluid. **(OR)**
 b) Derive an expression for escape speed.