M M A HIGHER SECONDARY SCHOOL-PAPPANADU

STD:XI   **VOLUME-2 MODEL QUESTION PAPER-2**   **TIME:3.00 HOURS**
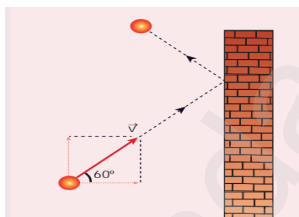
SUB: PHYSICS   **(UNIT:6-11)**   **MARKS:70**

I) CHOOSE THE CORRECT ANSWER: 15×1=15

1. The gravitational potential energy of the Moon with respect to Earth is

a) always positive   b) always negative   c) can be positive or negative   d) always zero

2. The dimensional formula of pressure is

a) $[M L^{-1}T^{-1}]$ b) $[M L^{-1}T^{-2}]$ c) $[M L^{-2}T^{-1}]$ d) $[M L^{2}T^{-2}]$

3. 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 Δl on applying a force F, how much force is needed to stretch the second wire by the same amount?

a) 2 F   b) 4 F   c) 8 F   d) 16 F

4. In a simple harmonic oscillation, the acceleration against displacement for one complete oscillation will be

a) a straight line   b) a circle   c) a parabola   d) an ellipse

5. 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

6. Consider two springs with force constants 1 N m^{-1} and 2 N m^{-1} connected in parallel. The effective spring constant of the combination is given by

a) 1 N m^{-1} b) 2 N m^{-1} c) 3 N m^{-1} d) 4 N m^{-1}

7. A particle of mass m is moving with speed u in a direction which makes 60° with respect to x axis. It undergoes elastic collision with the wall. What is the change in momentum in x and y direction?

a) $\Delta p_x = 0, \Delta p_y = mu$ b) $\Delta p_x = -2mu, \Delta p_y = 0$ c) $\Delta p_x = -mu, \Delta p_y = 0$ d) $\Delta p_x = mu, \Delta p_y = 0$

8. Due to rotation of the Earth, the acceleration due to gravity is maximum at

a) the equator of the earth   b) the pole of the earth

c) the center of the earth   d) slightly above the surface of the earth

9. Identify the state variables given here?

a) Q, T, W   b) P, T, U   c) Q, W   d) P, T, Q

10. With an increase in temperature, the viscosity of liquid and gas, respectively will

a) increase and increase   b) increase and decrease   c) decrease and increase   d) decrease and decrease

11. The time period of simple harmonic motion depends upon the

a)amplitude   b)energy   c)phrase constant   d)mass

12. Which of the following represents a wave

a) $(x-vt)^3$ b) sin(x+vt)   c) 1/(x+vt)   d) x(x+vt)

13. When a cycle tyre suddenly bursts, the air inside the tyre expands. This process is

a) isothermal   b) adiabatic   c) isobaric   d) isochoric

14. A uniform rope having mass m hangs vertically from a rigid support. A transverse wave pulse is produced at the lower end. Which of the following plots shows the correct variation of speed v with height h from the lower end?
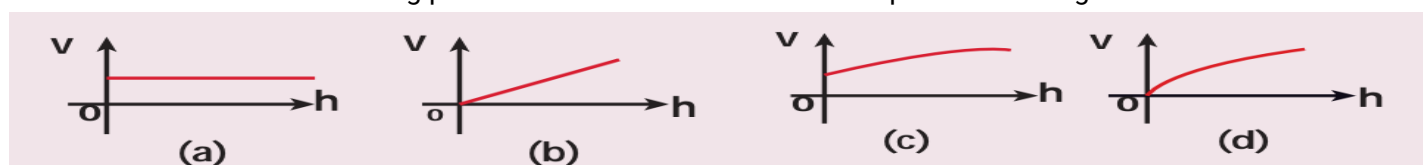
15. If the temperature and pressure of a gas is doubled the mean free path of the gas molecules

a) doubled   b) tripled   c) quadrapoled   d) remains same

II) ANSWER ANY SIX QUESTIONS:Q.NO:24 IS COMPULSORY: 6×2=12

16. Define gravitational potential.
17. What is the reason for Brownian motion?
18. Which one of these is more elastic, steel or rubber? Why?
19. State Stefan-Boltzmann law
20. Define Mach number.
21. "Soldiers are not allowed to march on a bridge." Give reason.
22. A metal cube of side 0.20 m is subjected to a shearing force of 4000 N. The top surface is displaced through 0.50 cm with respect to the bottom. Calculate the shear modulus of elasticity of the metal.
23. What is PV diagram?
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.

III) ANSWER ANY SIX QUESTIONS:Q.NO:33 IS COMPULSORY: 6×3=18

25. Explain in detail the kinetic interpretation of temperature.
26. Discuss the law of transverse vibrations in stretched strings.
27. Write any three applications of surface tension.
28. State Kepler's three laws.
29. A sound of frequency 1500 Hz is emitted by a source which moves away from an observer and moves towards a cliff at a speed of 6 ms^{-1}.
(a) Calculate the frequency of the sound which is coming directly from the source.
(b) Compute the frequency of sound heard by the observer reflected off the cliff. Assume the speed of sound in air is 330 m s^{-1}.
30. Derive the expression for the work done in a volume change in a thermodynamic system.
31. Distinguish between streamlined flow and turbulent flow.
32. What is meant by periodic and non-periodic motion?. Give any two examples, for each motion.
33. During a cyclic process, a heat engine absorbs 500 J of 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?

IV) ANSWER ALL THE QUESTIONS: 5×5=25

34. (a) Define terminal velocity. Derive the expression for the terminal velocity of a sphere moving in a high viscous fluid using stokes force.   [OR]
    (b) Explain how overtones are produced in a closed organ pipe.
35. (a) Derive an expression for escape speed.
                    [OR]
    (b) Derive the ratio of two specific heat capacities of monoatomic, diatomic and triatomic molecules.

36 (a) Discuss in detail the energy in simple harmonic motion.
                    [OR]
    (b) State and prove Bernoulli's theorem for a flow of incompressible, non-viscous, and streamlined flow of fluid.
37. (a) Explain in detail Newton's law of cooling.
                    [OR]
    (b) Explain the horizontal oscillations of a spring.
38. (a) Derive Mayer's relation for an ideal gas.
                    [OR]
    (b) Explain the variation of g with depth from the Earth's surface.

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