MMA HIGHER SECONDARY SCHOOL-PAPPANADU

STD:XI | FULL PORTION MODEL QUESTION PAPER-I | TIME:3.00 HOURS

SUB: PHYSICS | MARKS:70

I) CHOOSE THE CORRECT ANSWER: 15×1=15

1. Which of the following is an example of non-linear triatomic molecule?

a) Water b) Hydrogen c) Helium d) Nitrogen

2. The damping force on an oscillator is directly proportional to the velocity. The units of the constant of proportionality are

a) kg m s^{-1} b) kg m s^{-2} c) kg s^{-1} d) kg s

3. The process in which heat transfer is by actual movement of molecules in fluid such as liquid and gases is called

a) Thermal conductivity b) Convection c) Conduction d) Radiation

4. Eqution of travelling wave on a stretched string of linear density 5 g/m is y = 0.03 sin(450t−9x), where distance and time are measured in SI units. The tension in the string is

a) 5 N b) 12.5 N c) 7.5 N d) 10 N

5. Which of the following pairs of physical quantities have same dimension?

a) force and power b) torque and energy c) torque and power d) force and torque

6. The Young's modulus for a perfect rigid body is

a) 0 b) 1 c) 0.5 d) infinity

7. A rigid body rotates with an angular momentum L. If its kinetic energy is halved, the angular momentum becomes,

a) L b) L/2 c) 2L d) L/√2

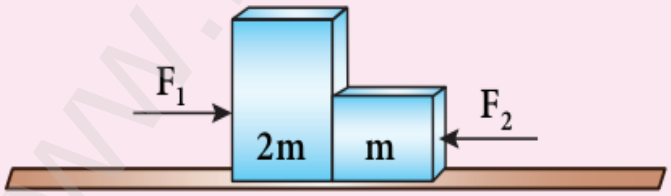
8. If a particle has negative velocity and negative acceleration, its speed

a) increases b) decreases c) remains same d) zero

9. If a stone of mass 0.25 kg tied to a string executes uniform circular motion with a speed of 2 m s^{-1} of radius 3 m, Then the magnitude of tensional force acting on the stone is

a) 0.666 N b) 0.333 N c) 1.5 N d) 0.25 N

10. Two blocks of masses m and 2m are placed on a smooth horizontal surface as shown. In the first case only a force F_1 is applied from the left. Later only a force F_2 is applied from the right. If the force acting at the interface of the two blocks in the two cases is same, then F_1:F_2 is



a) 1:1 b) 1:2 c) 2:1 d) 1:3

11. If a person moves from Chennai to Trichy, his weight

a) increases b) decreases c) remains same d) increases and then decreases

12. Two equal masses m_1 and m_2 are moving along the same straight line with velocities 5 ms^{-1} and -9 ms^{-1} respectively. If the collision is elastic, then calculate the velocities after the collision of m_1 and m_2, respectively

a) -4 ms^{-1} and 10 ms^{-1} b) 10 ms^{-1} and 0 ms^{-1} c) -9 ms^{-1} and 5 ms^{-1} d) 5 ms^{-1} and 1 ms^{-1}

13. If the distance between the Earth and Sun were to be doubled from its present value, the number of days in a year would be

a) 64.5 b) 1032 c) 182.5 d) 730

14. The wettability of a surface by a liquid depends primarily on

a) viscosity b) surface tension

c) density d) angle of contact between the surface and the liquid

15. In an isochoric process, we have
a) W = 0 b) Q = 0 c) ΔU = 0 d) ΔT = 0

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

16. Define surface tension of a liquid. Mention its S.I unit.
17. State Newton's second law.
18. What are longitudinal waves? Give one example.
19. What is inelastic collision?
20. Define free fall.
21. What is meant by superposition of gravitational field?
22. State the number of significant figures in the following (i) 600800 (ii) 5231.0 (iii) 400 (iv) 0.007
23. What is meant by free oscillation?
24. 500 g of water is heated from 30°C to 60°C. Ignoring the slight expansion of water, calculate the change in internal energy of the water? (specific heat of water 4184 J/kg K)

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

25. Derive the expression for centripetal acceleration.
26. What is the difference between sliding and slipping?
27. A metal plate of area 2.5×10^{-4} m^2 is placed on a 0.25×10^{-3} m thick layer of castor oil. If a force of 2.5 N is needed to move the plate with a velocity 3×10^{-2} m s^{-1}, calculate the coefficient of viscosity of castor oil.
28. Discuss the law of transverse vibrations in stretched strings.
29. What are the limitations of dimensional analysis?
30. Write the differences between conservative and Non-conservative forces.
31. Derive an expression for energy of satellite.
32. Using free body diagram, show that it is easy to pull an object than to push it.
33. An oxygen molecule is travelling in air at 300 K and 1 atm, and the diameter of oxygen molecule is 1.2×10^{-10}m. Calculate the mean free path of oxygen molecule.

IV) ANSWER ALL THE QUESTIONS: 5×5=25

34. (a) Derive an expression for escape speed. [OR]
(b) Explain the motion of blocks connected by a string in vertical motion.
35. (a) Obtain an expression for the time period T of a simple pendulum. The time period T depends on (i) mass 'm' of the bob (ii) length 'l' of the pendulum and (iii) acceleration due to gravity g at the place where the pendulum is suspended. (Constant k = 2π) [OR]
(b) (i) Obtain relation between momentum and Kinetic energy.
(ii) Two objects of masses 2 kg and 4 kg are moving with the same momentum of 20 kg ms^{-1}.
(A) Will they have same kinetic energy? (B) Will they have same speed?
36. (a) State and prove Bernoulli's theorem for a flow of incompressible, non-viscous, and streamlined flow of fluid. [OR]
(b) Discuss in detail the energy in simple harmonic motion.
37. (a) State and prove parallel axis theorem.
[OR]
(b) Derive Meyer's relation for an ideal gas.
38. (a) Explain how overtones are produced in an open organ pipe.
[OR]
(b) Derive the kinematic equations of motion for constant acceleration.

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