21001
PHYSICS

Time : 3 Hours] **[Maximum Marks : 70**

(Long Answer Type Questions) 5 each

1. Explain the term relative velocity with the help of position-time graph.

Or

Explain cross product of two vectors and mention its properties.

2. Define centripetal force and obtain an expression for centripetal force.

Or

What is Inertia ? Define and explain the *three* different types of inertia.

3. State Newton's law of gravitation and define the universal gravitational constant.

Or

Define Gravitational Potential. Derive an expression for gravitational potential.

4. Find the relation for time period of simple pendulum executing S.H.M.

Or

What are the characteristics of stationary waves ? Define nodes and antinodes.

(Short Answer Type Questions) 3 each

5. Name the coherent system of units and define kilogram.

6. Show that $P = \vec{F}.\vec{v}$, where the symbols have their usual meaning.

7. Derive the relation between Torque and Angular momentum.

8. Define coefficient of viscosity in liquids and define its unit.

9. Explain Young's modulus of elasticity.

10. Name the applications of first law of Thermodynamics.

11. Calculate the work done on compressing a gas at constant temperature.

12. Calculate the total energy of a body suspended with a spring of spring constant 2 Nm^{-1}, if its amplitude is 1.5 cm.

(Very Short Answer Type Questions) 2 each

13. Given $s = 4t^3 + 3$ calculate :

(i) $\frac{ds}{dt}$

(ii) $\frac{d^2s}{dt^2}$

14. Evaluate :

$$\int \frac{1}{\sqrt{x-1}}.dx$$

15. What is meant by range of the projectile ?

16. Differentiate between elastic and inelastic collision.

17. State theorem of parallel axis.

18. What is a reversible process ? Give its basic requirements.

19. Using the relation between pressure and kinetic energy of gas calculate kinetic energy per unit volume.

20. Velocity of sound is greater in solids than in gases. Explain.

(Objective Type Questions) 1 each

21. (i) The number 0.004 has significant figures equal to :

(A) 1

(B) 2

(C) 3

(D) 4

(ii) The dimensional formula of surface tension is :

(A) $[MLT^{-2}]$

(B) $[ML^0T^{-2}]$

(C) $[ML^2T^{-2}]$

(D) $[MLT^{-1}]$

(iii) The working of a rocket is based on the principle of :

(A) Elasticity

(B) Keppler's law

(C) Newton's law of gravitation

(D) Conservation of momentum

(iv) Which of the following is self-adjusting force :

(A) Static friction

(B) Limiting friction

(C) Dynamic friction

(D) Sliding friction

(v) If the momentum of a body is doubled, the kinetic energy in :

(A) Halved

(B) Unchanged

(C) Double

(D) Increased four times

(vi) The moment of inertia of a body does not depend upon :

(A) The angular speed

(B) Mass of body

(C) Nature of distribution of mass

(D) Location of the axis of rotation

(vii) Which of the following is independent of mass of earth ?

(A) Orbital velocity

(B) Escape velocity

(C) Gravitational intensity

(D) None of these

(viii) What flatens the large sized liquid drop ?

(A) Cohesion

(B) Adhesion

(C) Atmospheric pressure

(D) Gravity

(ix) Internal energy per mole of gas depends on :

(A) Viscosity

(B) Density

(C) Temperature

(D) Thermal Conductivity

(x) NTP corresponds to a temperature of :

(A) 0 K

(B) –273 K

(C) 273 K

(D) None of these