

TILOTTAMA SECONDARY SCHOOL

Assignment-2077

Class : 11

Subject: Physics

F.M. : 75

P.M : 27

GROUP 'A'

1. Attempt any six questions : [2×6=12]

- The pressure P, volume V and temperature T of a real gas are related through Vander Waals equation $[P+a/V^2][V-b]=RT$. Find the dimensions of a and b.
- What is the angle between velocity and acceleration of a projectile at highest point of motion?
- What are the basic differences between elastic and inelastic collision?
- A satellite does not need any fuel to circle around the earth, why?
- Which is more elastic: rubber or steel? Why?
- Hot soup is more tastier than cold soup. Why?
- What is the Physics behind swinging of a cricket ball?

2. Attempt any two questions : [2×2=4]

- Why do solids expand on heating? Write an expression for the variation of density with temperature.
- Explain why one feels Ice-cream at 0°C colder than water at 0°C.
- C_p is greater than C_v . why?

3. Attempt any one question : [2×1=2]

- What happens to the focal length of lens when it is dipped in water?
- On what factors does the illuminance of a surface depend?

4. Attempt any one question : [2×1=2]

- Two equipotential surfaces never intersect each other. why?
- Can we give any amount of charge to a capacitor?

Group ' B'

5. Attempt any three questions : [4×3=12]

- State and prove the principle of conservation of linear momentum. Also give an example to verify the principle.
- What is centripetal force? Derive an expression for centripetal force.

c. What do you mean by gravitational potential energy? Derive an expression for the gravitational potential energy of a body placed in the gravitational field of Earth.

d. What is surface tension? Derive an expression for the height ascended by a liquid in a capillary tube dipped in it.

6. Attempt any two questions : [4×2=8]

- Define water equivalent of a substance. Describe an experiment to determine the specific heat capacity of substance.
- What is ideal gas? Derive an expression for the pressure exerted by a gas.
- Describe the working of diesel engine. Express its working cycle on P-V diagram.

7. Attempt any one question : [4×1=4]

- What is lateral shift? Derive an expression for the lateral shift when light is refracted through a glass slab.
- Describe the working of a compound microscope and derive an expression for its magnifying power.

8. Attempt any one question : [4×1=4]

- State Gauss theorem and use it to find the electric field intensity at a point due to an infinitely long linear charge.
- What is a capacitor? Derive an expression for the energy stored in a charged capacitor and also derive expression for its energy density.

Group 'C'

9. Attempt any three questions: [4×3=12]

- The range of a projectile launched from ground at an angle of 15° to the horizontal is 1.5 km. What will be its range if it is projected at an angle of 45° to the horizontal?
- A block of mass 10 kg is pulled up at a constant speed from the bottom to the top of a smooth inclined plane 5 m long and inclined at 30° to the horizontal. Calculate the work done by the force applied parallel to the incline. [$g=9.8 \text{ m/s}^2$]
- A ring has moment of inertia 0.4 kg m². It is rotating at a rate of 2100 rev/min. Find the torque required to stop it in 2 seconds.

d. The length of a spring increases by 0.25 m when a body of mass 0.6 kg is suspended from it. If the body of mass 0.24 kg is suspended and stretched downward and released, what will be the time period of oscillation of spring? [$g=10 \text{ m/s}^2$]

10. **Attempt any two questions:** [$4 \times 2 = 8$]

a. A steel scale correct at 0°C is used to measure the length of a rod at 20°C . If the measured length is 50 cm, what is the correct length of rod? [α of steel = $12 \times 10^{-6} \text{ }^\circ\text{C}^{-1}$]

b. An Iron bar and a brass bar each of length 0.1 m and cross section area 0.02 m^2 are joined end to end. The free ends of iron and steel are maintained at 100°C and 0°C respectively. Find the temperature of the junction of two bars. [K of iron = $79 \text{ Wm}^{-1}\text{K}^{-1}$ and K of brass = $109 \text{ Wm}^{-1}\text{K}^{-1}$]

c. Air initially at a pressure of 1 atm is suddenly compressed such that its volume becomes one-fourth. Find the final pressure. [$\gamma = 1.5$]

11. A glass prism of refracting angle 60° and refractive index 1.5 is completely immersed in water of refractive index 1.33. Calculate the angle of minimum deviation of prism. 4

12. Two point charges $5 \times 10^{-9} \text{ C}$ and $3 \times 10^{-9} \text{ C}$ are kept 6 cm apart in air. Calculate the work done when the charges are moved 1 cm nearer. 3