

Roll No. ....

(07/22-II)

**5177**

**B.Sc. EXAMINATION**

(Second Semester)

**PHYSICS**

Paper I (PH-201)

Properties of Matter and Kinetic Theory of  
Gases

*Time : Three Hours*

*Maximum Marks : 40*

**Note :** Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. 1 is compulsory.

1. (a) Define a cantilever. 1
- (b) What is degree of freedom ? 1
- (c) What does the area under a Maxwell-Boltzmann distribution represent ? 2

- (d) What is rigid body ? 2
- (e) What is Hooke's law ? 2

### Unit I

2. (a) Derive the moment of inertia of a solid cylinder about an axis passing through its centre and perpendicular to its own axis. 4
- (b) State perpendicular axis theorem. Derive the expression for moment of inertia of a rectangular plate. 4
3. (a) A body is revolving around an axis in a circular motion with a radius of 0.1 m, the momentum of the body is given by 50 kgm/s. A torque is applied on the body for 4 seconds and the momentum becomes 100 kgm/s. Find the torque applied to the body. 4
- (b) Calculate the angular momentum of a rigid body rotating about a fixed axis. 4

## Unit II

4. (a) State Hooke's law. What are *three* types of stress and strain ? 5
- (b) The modulus of rigidity and Poisson's ratio of the material of a wire are  $2.87 \times 10^{10}$  N/m and 0.379 respectively. Calculate Young's modulus. 3
5. (a) Explain an experiment for the determination of Young's modulus. 4
- (b) Find an expression for bending moment. 4

## Unit III

6. (a) Derive van der Waals' equation for real gases. 4
- (b) Discuss law of equipartition of energy. 4
7. Discuss the following : 8
- (a) Ideal gas equation
- (b) Specific heat of gases
- (c) Average kinetic energy of gases.

## Unit IV

8. (a) Discuss the Maxwell's distribution of speeds. 5
- (b) What is most probable speed ? Discuss its using Maxwell's graph. 3
9. (a) Derive the expression for average and rms speed for gas molecules. 4
- (b) Explain the term mean free path and its temperature dependence. 4