

RAICHUR  
UNIVERSITY



# RAICHUR UNIVERSITY, RAICHUR

**Under Graduate Curriculum for Degree of  
Bachelor of Science (B.Sc) in**

**Physics  
(I & II Semester)**

**As per Revised NEP 2024  
With Effect from the Academic year from  
2024-25 and onwards**

## SEMESTER-I

# Mechanics and Properties of Matter

### Unit –1

**Laws of Motion:** Frame of reference (Galilean transformation and Lorentz transformation equation) Newton's Laws of motion .Dynamics of single and a system of particles. Centre of mass. Problems.

**Special Theory of Relativity:** Constancy of speed of light. Postulates of Special Theory of Relativity. Length contraction. Time dilation. Relativistic addition of velocities and relativistic mass variation.

### Unit –2

#### **Momentum and Energy:**

Definitions of Work and energy, Golden rule of mechanics, law of conservation of linear momentum with illustrations – two body collision. Law of conservation of energy with illustrations – inclined plane. , Define and mention of expressions for orbital velocity, escape velocity, Principle and working of satellite. Motion of Rocket –expression for instantaneous and final velocities of single stage rocket. Problems.

#### **Rotational Dynamics:**

Definition of rigid body, rotational motion of a rigid body, review of angular momentum, law of conservation of angular momentum. Relation between angular momentum and torque, Moment of inertia, Mention of law of parallel axes theorem and perpendicular axes theorem, Derivation of MI of circular disc and solid cylinder about various axes, theory of Flywheel Problems.

### Unit –3

#### **Elastic constants:**

Review of Hooke's law - Stress-strain diagram, elastic limit, breaking point, Relation between elastic constants and their moduli. Poisson's Ratio-expression for Poisson's ratio in terms of elastic constants .Problems.

#### **Bending and Torsional Elasticity:**

Bending of beams –bending moment, Theory of single cantilever, theory of uniform bending, Twisting couple on a cylinder. Theory of Torsional pendulum – constancy of  $I/T^2$  Problems.

## Unit –4

### **Viscosity:**

Review of fluid friction (wet friction) - Streamline flow and turbulent flow, equation of continuity. Expression of viscosity by Poiseuille's method, Expression of viscosity by Stoke's method (by dimension analysis), mention Reynold's number – its expression and significance. Problems.

### **Surface tension:**

Definition of surface tension. Surface energy, mention relation between surface tension and surface energy. Expression for pressure difference across curved liquid surface-excess pressure inside spherical liquid drop. Angle of contact significance and examples. Problems.

### **References Books:**

Sl. No.	Title of the Book	Authors Name	Publisher	Year of Publication
1	Mechanics New Edition	Prof. D. S. Mathur, Dr. P.S. Hemne	S. Chand &co.	2000
2	Principles of Physics	Walker, halliday, Resnick	Wiley	2019
3	Physics for Degree Students B.Sc First year	C.LArora Dr.P.S.Hemne	S.Chand & co.	2020
4	University Physics–with Modern Physics	Hugh DYoung,Roget A Freedman	Pearson	2017
5	Concept of Physics(Vol.1),	Verma HC,	Bharathi Bhavan Publishers,	2021
6	Mechanics–Berkely Physics Course,Vol-1	Charles Kittel	Tata Mc Graw Hill	2007
7	Properties of Matter,	Brijlaland Subramanyam	John Wiley & Sons Inc	2013

## Practical Content

### List of Experiments to be performed in the Laboratory (Minimum of 8 Experiments)

1.	Determination of g using bar pendulum (L versus T and L versus $LT^2$ graphs).
2.	Determination of moment of inertia of a Fly Wheel.
3.	Determination of rigidity modulus using torsional pendulum.
4.	Determination of elastic constants of a wire by Searle's method.
5.	Viscosity by Stoke's method.
6.	Viscosity by capillary flow method–Poiseuille's method.
7.	Surface tension by capillary rise method.
8.	Surface tension and Interfacial tension by drop weight method.
9.	Determination of elastic constants of a wire by Searle's method.
10.	Viscosity by Stoke's method.
11.	Verification of Hook's law.
12.	Determination of Spring constant, acceleration due to gravity and unknown mass.
13.	Determination of Young's modulus of a bar by the single cantilever method.
14.	Determination of Young's modulus of a bar by uniform bending method.
15.	Verification of parallel and perpendicular axes theorems.

### Reference Books:

Sl. No.	Title of the Book	Authors Name	Publisher	Year of Publication
1	B.Sc. Practical Physics	Harnamsingh, Dr. P.S.Hemne	S.Chand & co.	Revised Edition
2	Physics through experiments	B. Saraf	Vikas Publication	Revised Edition
3	B.Sc. Practical Physics	C.L Arora	S.Chand & co.	2020