



**Unit - III****Thermodynamics****Duration: 15 hrs**

Temperature, the zeroth law of thermodynamics, Temperature and heat, the absorption of heat by solids and liquids, a closer look at heat and work, the first law of thermodynamics, some special cases of first law of thermodynamics, heat transfer mechanisms

[18.2, 18.3, 18.7 to 18.12]

Pressure, temperature and rms speed, translational kinetic energy, mean free path, the distribution of molecular speed, the molar specific heats of an ideal gas, degrees of freedom and molar specific heat, a hint of quantum theory, the adiabatic expansion of an ideal gas

[19.4 to 19.11]

[Fundamentals of Physics: Resnick, Halliday & Walker, 8<sup>th</sup> ed]

**Note:** Illustrative problems on all the relevant topics should be covered.

**Reference books:**

1. University physics by Sears & Zimansky.
2. University physics by Freedman
3. Berkeley physics course volume I.
4. Mechanics by D. S. Mathur
5. Mechanics by J. C. Upadhyay
6. Heat & thermodynamics by Zemansky
7. Heat & thermodynamics by Brijlal & Subrahmanium



**Unit - III****Geometrical optics****Duration: 15 hrs**

Introduction, Fermat's principle of least time, Fermat's principle of least extrimum path, rectilinear propagation of light, reversibility of light rays, laws of reflection, laws of refraction

[2.1 to 2.6]

Introduction, cardinal points, principle points and principle planes, some remarkable features of principle planes, focal points and focal planes, nodal points and nodal planes, cardinal points of a coaxial system of two thin lenses.

[5.1, 5.2, 5.10]

Thick lens equation, telephoto lens, telescope lens

[6.3, 6.8]

Dispersion by a prism, refraction through a prism, angular dispersion, dispersive power, angular and chromatic dispersions

[8.1 to 8.5]

[A textbook of Optics: Brijlal and Subrahmanium, 24<sup>th</sup> ed]

**Note:** Illustrative problems on all the relevant topics should be covered.

**Reference books:**

1. Vector analysis by Murray Spigel
2. Berkeley physics course volume I.
3. Fundamentals of magnetism & electricity by D. N. Vasudeva
4. Electromagnetism by Grant & Philips
5. Electricity & magnetism by Rangwala & Mahajan
6. Fundamentals of optics by Jenkins & White
7. Optics by A. K. Ghatak

**List of experiments**  
**Semester – I**

<b>Group A</b>	
1	Error analysis
2	To verify the parallel axes theorem of moment of inertia
3	To verify the perpendicular axes theorem of moment of inertia
4	Modulus of rigidity of a wire using torsional pendulum
5	Modulus of rigidity of a rod by Searle's apparatus
6	Thermal conductivity of a bad conductor by Lee's method

<b>Group B</b>	
1	Low resistance by Wheatstone's bridge- method of projection
2	Study of decay of current in RC circuit
3	Cardinal points of a lens system placed in air
4	Determination of refractive index of liquid using lens system
5	Dispersive power of the material of a prism using spectrometer
6	Resistivity of the material of a conductor using Ohm's law



Introduction, constituents of nuclei, isotopes, Isobars, Isotones and mirror nuclei, Nuclear mass and binding energy, unit of atomic mass, binding energy and stability of nucleus, Nuclear size, nuclear forces.

[10.1 to 10.6, 10.9, 10.16]

[Atomic and Nuclear physics: Gupta and Ghosh, 2<sup>nd</sup> ed]

**Note:** Illustrative problems on all the relevant topics should be covered.

**Reference books:**

1. Oscillations & waves by H. J. Pain
2. Oscillations & waves by Brijlal & Subrahmanium
3. Oscillations & waves by Bajaj
4. Concepts of modern physics by A. Beiser
5. Atomic & nuclear physics by J. B. Rajam
6. Modern physics by K. Crane
7. Modern physics by Murugesan
8. Introduction to Modern Physics by Richtmyer, Kennard, Cooper.



**Note:** Illustrative problems on all the relevant topics should be covered.

**Reference books:**

1. Fundamentals of magnetism & electricity by D. N. Vasudeva
2. Electromagnetism by Grant & Philips
3. Electricity & magnetism by Rangwala & Mahajan
4. Fundamentals of optics by Jenkins & White
5. Optics by A. K. Ghatak
6. Microelectronics by Millman & Grabel
7. Electronics: Fundamentals & applications by Allen Mottershead

## List of experiments Semester – II

<b>Group A</b>	
1	Study of Simple Harmonic Motion
2	Speed of transverse waves on a stretched wire of various linear densities using Sonometer
3	Elastic constants ( $E$ , $G$ , & $K$ ) by Searle's method
4	Melde's experiment
5	" " by cantilever
6	" " by bending of a beam supported at two ends & loaded in the middle

<b>Group B</b>	
1	Study of magnetic field due to Solenoid
2	Impedance of an LCR ac series network
3	Young's double slit experiment using spectrometer
4	Newton's ring experiment
5	Study of rectifiers
6	Zener diode as a voltage regulator

**Note:**

1. The duration of each experiment is of 3 hours. Two such experiments are to be performed by each student per week.
2. In the external exam, a student will have to perform two experiments, each experiment of 3 hours duration.
3. It is recommended that there will not be more than 20 students per batch in the external exam.