**ALLAHABAD STATE UNIVERSITY, ALLAHABAD**
**SYLLABUS**
Three Years Degree Course
**PHYSICS**

**B.Sc.- FIRST YEAR**

| | | |
|---|---|---|
| **MAX. MARKS** | | **50** |
| PAPER I | MECHANICS AND WAVE MOTION | **50** |
| PAPER II | KINETIC THEORY OF GASES, THERMODYNAMICS AND RADIATION | **50** |
| PAPER III | CIRCUIT FUNDAMENTALS AND BASIC ELECTRONICS | **50** |
| PRACTICALS | TWO PRACTICALS (15+15 = 30 MARKS) + VIVA (10 MARKS) + RECORD (10 MARKS) | **50** |
| TOTAL | | **200** |

Candidate must obtain minimum pass marks (33%) in Theory and Practical Examinations separately.

## B. Sc. I

## PAPER I - MECHANICS AND WAVE MOTION

### UNIT-I

Inertial reference frame, Newton's laws of motion, Conservative and Non -conservative forces, Conservation of energy, linear momentum and angular momentum. Collision in one and two dimensions. cross section.

### UNIT -II

Rotational energy and rotational inertia for simple bodies, the combined translation and rotational and motion of a rigid body on horizontal and inclined planes. Simple treatment of the motions of a top. Relations between elastic constants, bending of beams and torsion of cylinder.

### UNIT - III

Central forces, Two particle central force problem. reduced mass, relative and centre of mass motion, Law of gravitation. Kepler's laws, motions of planets and satellites, geo-stationary satellites.

### UNIT IV

Simple harmonic motion. differential equation of S. H. M. and its solution, uses of complex notation, damped and forced vibrations. composition of simple harmonic motion.
Differential equation of wave motion. plane progressive waves in fluid media, reflection of waves, phase change on reflection, superposition. stationary waves. pressure and energy distribution, phase and group velocity.

**Text and Reference Books**

1. EM Purcell, Ed: "Berkeley Physics Course, Vol. 1, Mechanics" (McGraw-Hill).
2. The Feymman Lectures in Physics Vol. 1 (BI Publications.
3. J.C. Upadhyay: 'Mechanics'.
4. D.S. Mathur "Mechanics".

## PAPER II- KINETIC THEORY AND THERMODYNAMICS

### UNIT-I

**Ideal Gas:** Kinetic model. Deduction of Boyle's law. interpretation of temperature, Gas law and Avagadaro hypothesis, estimation of r.m.s. speeds of molecules. Equipartition of energy, specific heat of monatomic gas, extension to di-and triatomic gases, Behaviour at low temperatures. Adiabatic expansion of an ideal gas.

**Real Gas:** Vander Waals gas, equation of state, nature of Vander Waals forces, comparison with experimental P-V curves. The critical constants, gas and vapour. Joule expansion of ideal gas, and of a Vander Waals gas, Joule coefficient, estimates of J-T cooling.

### UNIT -II

**Liquefaction of gases:** Boyle temperature and inversion temperature. Liquefaction of hydrogen and helium gas. Refrigeration cycles, coefficient of performance.

**Transport phenomena in gases:** Molecular collisions, mean free path and collision cross sections. Estimates of molecular diameter and mean free path. Transport of mass. momentum and energy and interrelationship.

### UNIT - III

**The laws of thermodynamics:** The Zeroth law, various indicator diagrams, work done by and on the system, first law of thermodynamics, internal energy as a state function and other applications. Reversible and irreversible changes, Carnot cycle and its efficiency, Carnot theorem and the second law of thermodynamics. Different versions of the second law. Entropy, principle of increase of entropy. The thermodynamic scale of temperature; its identity with the perfect gas scale.

Impossibility of attaining the absolute zero, third law of thermodynamics. Thermodynamic relationships: Thermodynamic variables, Maxwell's general relationships, application to Joule-Thomson cooling and adiabatic cooling in a general system, Clausius-Clapeyron heat equation. First and second Clausius-Clapeyron latent heat equation. Thermodynamic potentials and equilibrium of thermodynamical systems, relation with thermodynamical variables.

### UNIT -IV

Blackbody radiation: Pure temperature dependence, Stefan-Boltzmann law, pressure of radiation, spectral distribution of Black body radiation, Wien's displacement law, Rayleigh-Jean's law, The ultraviolet catastrophy, Plank's Law, Kirchaff's Law: absorption and emission.

**Text and Reference Books**

1. Fundamentals of Statistical and Thermal Physics, by F. Rief.
2.Thermodynamics by E. Fermi
3. Thermal Physics by C. Kittel and H. Kroemer.
4. Heat, Thermodynamics and Statistical Physics, by Brij Lal, N. Subrahmayam, P. S. Hemne.
5. Thermal Physics,by G. G. Agarwal and H. P. Sinha.
6. Thermal Physics, by S. K. Agarwal and B. K. Agarwal.

## PAPER III - CIRCUIT FUNDAMENTALS AND BASIC ELECTRONICS

### UNIT-I

Growth and decay of currents through inductive resistances, charging and Discharging in R.C. and R.L.C. circuits, Time constant, Measurement of high resistance.
A.C. Bridges, Maxwell's and Schering's Bridges, Wien Bridge. THEVENIN, NORTON and Superposition theorems and their applications.

### UNIT -II

Semiconductors, intrinsic and extrinsic semiconductors, n-type and p-type semiconductors, unbiased diode, forward bias and reverse bias diodes, diode as a rectifier, diode characteristics, zener diode, avalanche and zener breakdown, power supplies, rectifier, bridge rectifier, capacitor input filter, voltage regulation, zener regulator. Bipolar transistors, three doped regions, forward and reverse bias, DC alpha, DC beta transistor curves.

### UNIT - III

Transistor biasing. DC load line. Basic AC equivalent circuits. low frequency model, small signal amplifiers. Common emitter amplifier, common collector amplifiers, and common base amplifiers, current and voltage gain. R.C. coupled amplifier, gain, frequency response, equivalent circuit at low, medium and high frequencies, feedback principles.

### UNIT-IV

Input and output impedance, transistor as an oscillator, general discussion and theory of Hartley oscillator only. cathode ray oscillograph and its simple applications. Lissajous figure and its application.

### Text and Reference Books


1. Solid State Electronic Devices,by B. G. Streetman (Prentice Hall of India, New Delhi).
2. Electronic Devices, Circuits and Applications, by W. D. Stanley: (Prentice-Hall, New Delhi).
3. Electronics Fundamentals and Applications by J. D. Ryder, (Prentice-Hall of India, New Delhi).
4. Electronic Devices and Circuits,by J. Millman & C. Halkias, (Mc Graw Hill).
5 .Electrical Circuits and Introductory Electronics,by Vinod Prakash, (Lok Bharti Prakashan, Allahabad).
6. Principles of Electronics, by V.K.Metha, Rohit Mehta (S. Chand).


### PRACTICALS

Every institution may add any experiment of the same standard in the subject.

**Mechanics**

1. Study of laws of parallel and perpendicular axes for moment of inertia.

2. Study of conservation of momentum in two dimensional oscillations.

**Oscillations**

1. Study of a compound pendulum.
2. Study of damping of a bar pendulum under various mechanics.
3. Study of oscillations under a bifilar suspension.
4. Potential energy curves of a 1-Dimensional system and oscillations in it for various amplitudes.
5. Study of oscillations of a mass under different combinations of springs.

**Properties of matter**

1. Study of bending of a cantilever or a beam.
2. Study of torsion of a wire (static and dynamic methods)

**Kinetic theory of matter**

1. Study of Brownian motion.
2. Study of adiabatic expansion of a gas.
3. Study of conversion of mechanical energy into heat.
4. Heating efficiency of electrical kettle with varying voltages.

**Thermodynamics**

1. Study of temperature dependence of total radiation.
2. Study of temperature dependence of spectral density of radiation.
3. Resistance thermometry.
4. Thermo-emf thermometry
5. Conduction of heat through poor conductors of different geometries.

**Circuit fundamentals**

1. Charging and discharging in R.C. and R.C.L. circuits
2. High resistance by leakage.
3. A.C. Bridges.
4. Half wave and full wave rectifiers.
5. Characteristics of a transistor in CE,CB and CC configurations
6. Frequency response of R.C coupled amplifier.

**Waves**

1. Speed of waves on a stretched string
2. Studies on torsional waves in a lumped system.
3. Study of interference with two coherent sources of sound.

**Text and reference books**


1. D. P. Khandelwal, "A laboratory manual for undergraduate classes" (Vani Publishing House, New Delhi).
2. S. P. Singh, "Advanced Practical Physics" (Pragati Prakashan, Meerut).
3. B. L. Worsnop and H. T. Flint, "Advanced Practical physics for students".
4. S. K. Kor, "Practical Physics"
5. Prctical Physics by C.L.Arora.

**B. Sc. II**

| | | |
|---|---|---|
| **MAX. MARKS** | | **50** |
| PAPER I | PHYSICAL OPTICS AND LASERS | **50** |
| PAPER II | ELECTROMAGNETICS | **50** |
| PAPER III | ELEMENTS OF QUANTUM MECHANICS, ATOMIC SPECTRA | **50** |
| PRACTICALS | TWO PRACTICALS (30 MARKS) – VIVA (10 MARKS) + RECORD (10 MARKS) | **50** |
| TOTAL | | **200** |

## PAPER I - PHYSICAL OPTICS AND LASERS

### UNIT-I

**Interference of a light:** The principle of superposition, two-slit interference, coherence requirement for the sources, optical path retardations, latera shift of fringes, Rayleigh refract meter and other applications. Localised & unlocalised frir ges. Thin Films Newton's Ring, determination of wavelength of sodium light by Newton's ring.

**Haidinger fringes:** Fringes of equal inclination. Michelson interferometer, its application for precision determination of wavelength, wavelength difference and the width of spectral lines. Antireflection Coating. Optical filters. Intensity distribution in multiple beam interference, Fabry-Perrot interferometer and etalon.

### UNIT -II

**Fresnel diffraction:** Fresnel half-period zones, straight edge, rectilinear propagation.

**Fraunhoffer diffraction:** Diffraction due to single slit, diffraction at a circular aperture and double slit, missing orders spectrum. Distinction between interference and diffraction. Rayleigh criterion of resolution, reso ving power of telescope and microscope and prism.

**Diffraction gratings:** Diffraction at N parallel slits. intensity distribution. plane diffraction grating, determination of wavelength by grating. Reflection grating, blazed gratings, concave grating and different mountings (Qualitative). Resolving power of a grating .

### UNIT - III

Polarization, Double refraction in uniaxial crystals. Nicol prism, polaroids and retardation plates, Babinet's compensator. Analysis of polarised light Optical activity and Fresnel's explanation, Half shade and Biquartz polarimeters.

### UNIT-IV

**Laser system:** Purity of a special line, coherence length and coherence time, spatial coherence of a source, Einstein's A and B coefficients, spontaneous and induced emissions, conditions for laser action, population inversion. Three and four level laser with Example Ruby & (He-Ne). Application of Lasers, spatial and temporal coherence and spectral energy density.

**Text and Reference Books :**


Physical Optics by A. K. Ghatak, (Tata McGrew Hill)
Optics and Atomic Physics by D. P. Khandelwal;" (Himalaya Publishing House, Bombay).
Optics, by Born and Wolf.
Optics, by K D Moltey, (Oxford University Press).
Optics, by Sears.
Fundamental of Optics by Jenkins and White; (McGraw-Hill).
Optics. by B.K; Mathur;
Optics by P.K. Srivastava; (CBS).
Lasers by B.B. Laud; (New Age).
A Text Book of Optics, by Brij Lal, M N Avadhanulu & N Subrahmanyam (S.Chand).

## PAPER II- ELECTROMAGNETICS

### UNIT-I

**Electrostatics** :Coulomb's law, Electric Field and potentials, Field due to a uniform charged sphere, Derivations of Poisson and Laplace Equations, Gauss Law and its application: The Field of a conductor. Electric dipole, Field and potential due to an electric dipole, Dipole approximation for an arbitrary charge distribution, Electric quadruple, Field due to a quadruple , Electrostatic Energy of a charged uniform sphere, Energy of a condenser.

### UNIT-II

**Magnetostatics:** Magnetic field, Magnetic force of a current, Magnetic Induction and Biot-Savart Law, Lorentz Force, Vector and Scalar Magnetic potentials, Magnetic Dipole, Magnetomotive force and Ampere's Circuital theorem and its applications to calculate magnetic field due to wire carrying current and solenoid.

### UNIT-III

**Electromagnetic Induction** :Laws of Induction, Faraday's laws and Lanz's Law. Mutual and Self Induction, Vector potential in varying Magnetic field, Induction of current in continuous media, Skin effect, Motion of electron in changing magnetic field , Betatron, Magnetic energy in field, Induced magnetic field (Time varying electric field), Displacement current, Maxwell's equations, Theory and working of moving coil ballistic galvanometer.

### UNIT-IV

**Electromagnetic Waves :** The wave equation satisfied by E and B, plane electromagnetic waves in vacuum, Poynting's vector, reflection at, a plane boundary of dielectrics, polarization by reflection and total internal reflection, Faraday effect: waves in a conducting medium, reflection and refraction by the ionosphere.

**Text and Reference Books**


Electricity and Magnetism Berkeley Physics Course; Ed. E.M. Purcell (Mc GrawHill).

Halliday and Resnik; "Physics", Vol 2.

Introduction to Electrodynamics by D.J Griffith; (Prentice-Hall of India).

Electricity and Magnetism, by Reitz and Milford; (Addison-Wesley).

Electricity and Magnetism, by A S Mahajan and A A Rangwala; (Tata McGraw-Hill).

Electromagnetic Fields by A M Portis.

Principles of Electricity and Magnetism, by Pugh and Pugh; (Addison-Welsley).

Classical Electricity and Magnetism, by Panofsky and Phillips; (India Book House).

Electromagnetics by B.B. Laud, Wiley Eastern Limited.

## PAPER III – ELEMENTS OF QUANTUM MECHANICS, ATOMIC SPECTRA

### UNIT-I

**Matter Waves:** Inadequacies of classical mechanics, Photoelectric phenomenon, Compton effect, wave particle duality, de- Broglie matter waves and their experimental verification, Heisenberg's Uncertainty principle. Complementarity principle. Principle of superposition, Phase and Group Velocity .

### UNIT -II

**Schrodinger Equation and its Applications** :Schrodinger wave equation Interpretation of wave function, Expectation values of dynamical variables, Ehrenfest theorem, Orthonormal and Orthogonal properties of wave functions, One dimensional motion in step potential, Rectangular barrier, Square well potential, Particle in a box.

### UNIT– III

**Hermitian operator**: Properties of Hermitian operator, Commutator algebra, commutation relation between position and momentum, Hamiltonion and momentum, angular momentum and its component, total angular momentum and its components. Linear Harmonic oscillator (qualitative).Spherically symmetric system, Hydrogen atom, normal state of hydrogen atom.

### UNIT-IV

**Atomic spectra:** Spectra of hydrogen, deuteron and alkali atoms, spectral terms, doublet fine structure, screening constants for alkali spectra for s, p, d, and f states, selection rules. Singlet and triplet fine structure in alkaline earth spectra, L-S and J-J couplings. Weak spectra: continuous X-ray spectrum and its dependence on voltage, Duane and Haunt's law. Characteristics X-rays, Moseley's law, doublet structure and screening parameters in X-ray spectra, X-ray absorption spectra.

**Text and Reference Books**


Introduction to Modern Physics, by H S Mani and G K Mehta (Affiliated East-West Press ).

Introduction to Atomic Physics, by H E White.

Atomic & Molecular spectra:laser, by Raj Kumar Kedar Nath Ramnath Pulication.

Modern Physics by R. Murugeshan, Kiruthiga Sivaprasath; S Chand.

The Feymann Lectures on Physics, by R P Feymann, R B Leighton and M Sands. Vol. III (B I Publications. Bombay. Delhi. Calcutta. Madras).

Eisenberg and Resnik; "Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles" (John Wiley)

Atomic and Nuclear Physics. Brij Lal & N Subrahmanyam.

Qunatum Mechanics by Gupta, Kumar and Sharma ;Jai Prakash Nath&Co.

Quantum Mechanics –Theory and Application, by A.K. Ghatak and S. Loknathan.

## PRACTICALS

Every institution may add any experiment of the standard in the subject.

**Physical optics**

1. Study of interference of light (baptism or wedge film).
2. Study of F-P etalon fringes.
3. Study of diffraction at a straight edge or a single slit
4. Use of diffraction grating and its resolving limit.
5. Resolving limit of a telescope system.
6. Polarization of light by the reflection.
7. Study of optical rotation for any system.

**Electrostatics**

1. Characteristics of a ballistic galvanometer.
2. Setting up and using an electroscope or electrometer.

**Moving charges and magnetostatics**

1. Use of a vibration magnetometer to study a field.
2. Study of field due to a current.
3. Measurement of low resistance by Carey-Foster bridge or otherwise.
4. Measurement of inductance using impedance at different frequencies.
5. Measurement of capacitance using impedance at different frequencies
6. Study of decay of currents in LR and RC circuits.
7. Response curve for LCR circuit and resonance frequency and quality factor.

**Varying fields and electromagnetic theory**

1. Sensitivity of a cathode-ray oscilloscope.
2. Characteristic of a choke.
3. Measurement of inductance.
4. Study of Lorentz force
5. Study of discrete and continuous LC transmission lines.

**Atomic Physics**

1. Study of spectra of hydrogen and deuterium (Rydberg constant and ratio of masses of electron to proton).
2. Absorption spectrum of iodine vapour.
3. Study of alkali or alkaline earth spectra using a concave grating.
4. Study of Zeeman effect for determination of Lande g-factor
5. Study of Raman spectrum using laser as an excitation source

**Lasers**

1 Study of laser as a monochromatic coherent source
2 Study of divergence of a laser beam

**Text and Reference Books**

D.P. Khandelwal, "A Laboratory Manual for Undergraduate Classes (Vani Publishing House, New Delhi).
S.P. Singh, "Advanced Practical Physics" (Pragati Prakashan, Meerut).
Worsnop and Flint- Advanced Practical physics for students.
Practical Physics by C.L. Arora.

## B. Sc.-III

## PAPER I - RELATIVITY AND STATISTICAL PHYSICS

### UNIT-I

**Relativity:** Reference systems, inertial frames, Galilean invariance and conservation laws, propagation of light, Michelson-Morley experiment; search for ether. Postulates for the special theory of relativity, Lorentz transformations, length contraction, time dilation, velocity addition theorem, variation of mass with velocity, mass-energy equivalence, particle with a zero rest mass.

### UNIT-II

**Statistical physics :**

**The statistical basis of thermodynamics:** Probability and thermodynamic probability, principle of equal a prior probabilities, probability distribution and its narrowing with increase in number of particles. . The expressions for average properties. Constraints; accessible and inaccessible states, distribution of particles with a given total energy into a discrete set of energy states.

### UNIT- III

**Some universal laws:** The μ (mu)- space representation, division of μ (mu)-space into energy sheets and into phase cells of arbitrary size, applications to one-dimensional harmonic oscillator and free particles. Equilibrium before two systems in therma contact, bridge with macroscopic physics. Probability and entropy, Boltzmann entropy relation. Statistical interpretation of second law of thermodynamics. Boltzmann canonical distribution law and its applications; rigorous form of equipartition of energy.

### UNIT -IV

**Maxwellian distribution of speeds in an ideal gas:** Distribution of speeds and of velocities, experimental verification, distinction between mean, r.m.s. and most probable speed values. Doppler broadening of spectral lines. Bose-Einstein, and Fermi-Dirac distributions, photons in black body chamber, free electrons in a metal, Fermi level and Fermi energy.

**Text and Reference Books**

Concepts of Modern Physics by A. Beiser. (McGraw-Hill).
Introduction to Statistical Mechanics by B.B Laud, (Macmillan ).
Statistical Physics, by F Reif. (McGraw-Hill ).
Statistical Physics, by K Haung, (Wiley Eastern).
Introduction to Special Relativity, by Robert Resnick.

## PAPER II- SOLID STATE AND NUCLEAR PHYSICS

### UNIT-I

**Crystal Structure:**
Lattice translation vectors and lattice, Symmetry operations, Basis and Crystal structure, Primitive Lattice cell, Two-dimensional lattice types, systems, Number of lattices, Three dimensional lattice types, Systems, Number of Lattices. Index system for crystal planes Miller indices, Simple crystal structures, NaCl, hcp, diamond. Cubic ZnS and hexagonal.

**Crystal Diffraction and Reciprocal Lattice**
Bragg's law, Experimental diffraction method, Laue method Rotating crystal method. Powder method, Derivation of scattered 'wave amplitude, Atomic term factor, Reciprocal lattice vectors, Diffraction conditions, Ewald's method, Reciprocal lattice to sc, bcc and fcc lattices.

### UNIT -II

**Crystal Bondings:** Crystal of inert gases, Van der Walls-London interaction, repulsive interaction, Equilibrium lattice constants, Cohesive energy, compressibility and bulk modulus, ionic crystal, Madelung energy, evaluation of Madelung constant, Covalent crystals, Hydrogen-bonded crystals, Atomic radii.

### UNIT-III

**Lattice Vibrations:** Lattice Heat capacity, Einstein model. Vibrations of monatomic lattice, derivation of dispersion relation, First brillouin zone, group velocity, continuum limit, Force constants, Lattice with two atoms per primitive cell, derivation of dispersion relation, Acoustic and optical modes, Phonon momentum. Hall effect in metals. Qualitative idea of Bloch theorem and Kronig-Penney model. Effective mass and Concept of holes.

### UNIT - IV

**Nuclear Physics**
**General Properties of Nucleus:** Brief survey of general Properties of the Nucleus. Mass defect and binding energy, charges, Size, Spin and Magnetic moment.
**Nuclear Forces:** Saturation phenomena and Exchange forces, Deutron ground state properties. Nuclear Models: Liquid drop model and Bethe Weiszacker mass formula. **Nuclear Reactions:** Nuclear reactions and their conservation laws, Cross section of nuclear reactions, Theory of fission (Qualitative), Nuclear reactors and Nuclear fusion
**Elementary Particles:** Basic classification based on rest mass, Spin and half life, particle interactions (gravitational, Electromagnetic, week and strong Interactions).

**Text and Reference Books**
Solid State Physics, by Pun and Babbar, (S. Chand).
Introduction to Solid State Physics, by C. Kittel, (John Wiley &Sons).
Solid State Physics by H.C. Gupta; Vikas Publishing House, New Delhi.
Solid State Physics by Gupta and Kumar.
Atomic and Nuclear Physics .T.A. Littlefield and N. Thoreley," (Engineering
Language Book Society).
Nuclear Physics S.N. Ghoshal (S. Chand & Co)
Nuclear Physics by D.C.Tayal; Himalaya Publishing House.

## PAPER III - SOLID STATE ELECTRONICS

### UNIT-I

Diffusion of minority carriers in semiconductor, work function in metals and semiconductors Junctions between metal and semiconductors, Semiconductor and semiconductor, p.n. Junction, Depletion layer, Junction Potential Width of depletion layer, Field and Capacitance of depletion layer. Forward A.C. and D.C. resistance of junction, Reverse Breakdown. Zener and Avalanche diodes, Tunnel diodes, Point contact diode, their importance at High frequencies, LED photodiodes, Effect of temperature on Junction diode Thermistors.

### UNIT -II

Transistor parameters, base width modulation, transit time and life-time of minority carriers, Base- Emitter resistance Collector conductance. Base spreading resistance, Diffusion capacitance, Reverse feedback ratio, Equivalent circuit for transistors. Basic model, hybrid model and Y parameter equivalent circuit, Input and output impedances.

### UNIT-III

Current and Voltage gain, Biasing formulae for transistors, Base bias, emitter bias and mixed type bias and mixed type biasing for small and large signal operation. Transistor circuit application at law frequencies, their AC and DC equivalent for three different modes of operation. Cascading of stages. Frequency response, Negative and positive feedback in transistor amplifiers.

### UNIT –IV

Digital Electronics: Binary numbers, addition and subtraction. Conversion from decimal to binary and vice-versa. Hexadecimal number system. Boolean theorem . Boolean identities. OR, AND, NOT, NAND, NOR gates. X-OR and X-NOR universal gates, de-Morgan's theorem, SOP and POS. Karnaugh Map. Basic linear integrated circuits, phototransistors, Silicon Controlled rectifiers.

**Text and Reference Books**

Solid State Electronic Devices, by B G Streetman; (Prentice-Hall of India. New Delhi.)
Electronic Devices, Circuits and Applications. by W D Stanley (Prentice-Hall.
New Jersey, USA.)
Electronics Fundamentals and Applications by J D Ryder.(Prentice-Hall of India. New Delhi).
Microelectronics, by Miliman and A Grabel. International Edition (McGraw-Hill Book Company, New York).
Electronic Devices:Analog and digital Circuits and system, by Millman & Halkias ( Tata McGraw-Hill Publishing Company).

## PRACTICAL

**NOTE:**

This is a suggested list. Every institution may add any experiment of same standard in the same subject area.

**Statistical Physics**

1. Data from n-option systems of several relative weightages to be examined and interpreted.
2. Plotting F-D distribution in the neighbourhood of Fermi energy for different temperature values.
3. Solar wind as a thermal expansion of solar corona at one million Kelvin.
4. Study of dilute gas for experimental verification of Maxwel -Boltzman statistics.
5. Number of microscopic states of perfect gas (Gibbs-parador ).

**Solid State Physics**

1. Goniometric study of crystal faces
2. Determination of dielectric constant.
3. Hysteresis curve of transformer core.
4. Hall-probe method for measurement of magnetic field

**Solid State Devices**

1. Specific resistance and energy gap of a semiconductor
2. Characteristics of a transistor
3. Characteristics of a tunnel diode

**Electronics**

1. Study of voltage regulation system
2. Study of, a regulated power supply
3. Study of Lissajuous figures using a CRO
4. Study of VTVM
5. Study of RC and TC coupled amplifiers
6. Study of AF and RF oscillators

**Nuclear Physics**

1. Study of absorption of alpha and beta rays.
2. Study of statistics in radioactive measurement

**Text and Reference Books**

B.G. Strechman, "Solid State Electronic Devices", II Edition (Prentice-Hall of India, New Delhi).
W.D. Stanley, "Electronic Devices, Circuits and Applications" (Prentice-Hall, New Jersey, USA).
D.P. Khandelwal, "A Laboratory Manual for Undergraduate Classes (Vani Publishiing House, New Delhi).
S.P. Singh, "Advanced Practical Physics"(Pragati Prakashan, Meerut).
Practical Physics by, C.L Arora.