Proposed Syllabus for

PHYSICS

B. Sc. I

		Maximum Marks
Paper I	**MECHANICS AND WAVE MOTION**	**50**
Paper II	**KINETIC THEORY AND THERMODYNAMICS**	**50**
Paper III	**CIRCUIT FUNDAMENTALS AND BASIC ELECTRONICS**	**50**
Practical	**Two practicals (30 Marks) + Viva (10 Marks) + Record (10 Marks)**	**50**
Total		**200**

Candidate must obtain minimum pass marks in Theory and Practical Examinations separately.

Convener (Physics)
C.S.J.M. University
Kanpur

B. Sc. I, PAPER I: MECHANICS AND WAVE MOTION

UNIT-I

Inertial and non-inertial frame of references, Newton's laws of motion, Dynamics of particle in rectilinear and circular motion, Conservative and Non -conservative forces, Conservation of energy, linear momentum and angular momentum, Collision in one and two dimensions.

UNIT -II

Rigid body, Moment of inertia, Theorem of parallel and perpendicular axes, Calculation of moment of inertia of thin rod, ring, disc, cylinder and sphere, combined translation and rotational and motion of a rigid body on horizontal and inclined planes.

Elastic constants and their interrelationship, Bending of beams and Torsion of cylinder.

UNIT - III

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

UNIT IV

Simple harmonic motion, differential equation of S. H. M. and its solution, 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:

E. M. Purcell, Ed: "Berkeley Physics Course, Vol. 1, Mechanics" (McGraw-Hill).

R. P. Feynman, R. B Lighton and M. Sands; "The Feynman Lectures in Physics", Vol. 1 (BI Publications, Bombay, Delhi, Calcutta, Madras).

J. C. Upadhyay: 'Mechanics'.

D. S. Mathur "Mechanics".

P. K. Srivastava: "Mechanics" (New Age International).

B. Sc. I PAPER II- KINETIC THEORY AND THERMODYNAMICS

UNIT-I

Ideal Gas: Kinetic model, Deduction of Boyle's law, interpretation of temperature, estimation of r. m. s. speeds of molecules. Brownian motion, estimate of the Avogadro number. Equipartition of energy, specific heat of monatomic gas, extension to di- and triatomic gases, Behaviour at low temperatures. Adiabatic expansion of an ideal gas, applications to atmospheric physics.

Real Gas: Vander Waals gas, equation of state, nature of Van der Waals forces, comparison with experimental P-V curves. The critical constants, 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, Principle of regenerative cooling and of cascade cooling, liquefaction of hydrogen and helium gas. .

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, dependence on temperature and pressure.

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, Reversible and irreversible changes, Carnot cycle and its efficiency, Carnot theorem and the second law of thermodynamics. Different versions of the second law, practical cycles used in internal combustion engines. 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; extensive and intensive, Maxwell's general relationships, application to Joule-Thomson cooling and adiabatic cooling in a general system, Van der Waals gas, Clausius-Clapeyron heat equation. Thermodynamic potentials and equilibrium of thermodynamical systems, relation with thermodynamical variables. Cooling due to adiabatic demagnetization, production and measurement of very low temperatures.

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, Planck's Law, Kirchoff's Law.

Text and Reference Books:

G.G. Agarwal and H.P. Sinha "Thermal Physics"

S.K. Agarwal and B.K. Agarwal "Thermal Physics"

B. Sc. I: PAPER III CIRCUIT FUNDAMENTALS AND BASIC ELECTRONICS

UNIT - I

Growth and decay of current through R-L circuit, Charging and discharging in RC and R-L-C circuits, Time constant, Measurement of high resistance

AC Bridges, Maxwells, Schering and Wein Bridges

Thevenin's, Norton's, Maximum power transfer and Superposition theorems and their applications

UNIT – II

Semiconductors, Intrinsic and extrinsic semiconductors, n-type and p-type semiconductors, PN junction diode, Forward and reverse biased diodes, Diode characteristics, Diode as a rectifier, Bridge rectifier, Filters, Diode as temperature sensor, Zener diode, Avalenche and Zener breakdown, Voltage regulation, Zener diode voltage regulator, Power supply, LED, Photodiodes

Bipolar junction transistors, DC alpha, DC beta, Transistor characteristics curves

UNIT – III

Transistor biasing circuits, Base bias, Emitter bias and Voltage divider bias, DC load line

Basic transistor AC equivalent circuits, Small signal low frequency model, Common base amplifier, common emitter amplifier, Voltage gain, current gain, input impedance and output impedance, Feedback principles, Negative and positive feedback in amplifiers, Transistor as an oscillator, Barkhausen criterion for sustained oscillation.

UNIT – IV

Elements of transmission and reception, Basic principles of amplitude modulation and demodulation, Principle and design of linear multimeters and their applications, Constant current and voltage sources, Cathode ray oscillograph, its sensitivity and simple applications.

Text and Reference Books:

B. G. Streetman; "Solid State Electronic Devices", IInTdi Edition (Prentice Hall of India, New Delhi, 1986).
W. D. Stanley: "Electronic Devices, Circuits and Applications" (Prentice-Hall)
J. D. Ryder, "Electronics Fundamentals and Applications", II'' Edition (Prentice-Hall).
J. Millman and A. Grabel, "Microelectronics", International Edition (McGraw Hill Book Company).

B. Sc. I Physics Practicals Suggested List

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

1. Study of laws of parallel and perpendicular axes for moment of inertia.
2. Study of conservation of momentum in two dimensional oscillations.
3. Study of a compound pendulum (Bar and Katers)
4. Study of damping of a bar pendulum under various mechanics.
5. Study of oscillations under a bifilar suspension.
6. Potential energy curves of a 1-Dimensional system and oscillations in it for various amplitudes.
7. Study of oscillations of a mass under different combinations of springs.
8. Study of bending of a cantilever or a beam.
9. Study of torsion of a wire (static and dynamic methods).
10. Young's Modulus by flexural vibration
11. Modulus of rigidity by Torsional vibration.
12. Study of temperature dependence of total radiation.
13. Study of temperature dependence of spectral density of radiation.
14. Resistance thermometry.
15. Variation of thermo-emf with temperature to find neutral temperature
16. Conduction of heat through poor conductors of different geometries.
17. Charging and discharging in R. C. and R. C. L. circuits.
18. High resistance by leakage.
19. A.C. Bridges.
20. PN junction diode as temperature sensor
21. Speed of waves on a stretched string.
22. Studies on torsional waves in a lumped system.
23. Study of interference with two coherent sources of sound.

Text and reference books:

D. P. Khandelwal, "A laboratory manual for undergraduate classes" (Vani Publishing House)

S. P. Singh, "Advanced Practical Physics" (Pragati Prakashan, Meerut).

Worsnop and Flint- Advanced Practical physics for students.

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PHYSICS

B. Sc. II

		Maximum Marks
Paper I	**PHYSICAL OPTICS AND LASERS**	**50**
Paper II	**ELECTROMAGNETICS**	**50**
Paper III	**ELEMENTS OF QUANTUM MECHANICS, ATOMIC AND MOLECULARS SPECTRA**	**50**
Practical	**Two practicals (30 Marks) + Viva (10 Marks) + Record (10 Marks)**	**50**
Total		**200**

Candidate must obtain minimum pass marks in Theory and Practical Examinations separately.

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B. Sc. II: PAPER I - PHYSICAL OPTICS AND LASERS

UNIT-I

Interference of a light: The principle of superposition, coherent sources, theory of interference, conditions for sustained interference.

Division of wavefront: Two-slit interference, Fresnel's biprism, lateral shift and displacement of fringes, white light fringes, phase change on reflection.

Division of amplitude: Interference by a plane parallel thin film, cosine law, colours of thin film. Fringes of equal thickness, wedge shaped film and Newton's ring. Fringes of equal inclination, Michelson interferometer, Fabry Perot interferometer and etalon. Sharpness of fringes. Rayleigh refractometer.

UNIT -II

Diffraction of light: Fraunhoffer diffraction- Single, double and N parallel slit, intensity distribution, plane diffraction grating, grating spectrum, absent spectra, concave reflection grating and its mounting.

Fresnel diffraction: Huygen's principle, Fresnel half-period zones, zone plates, circular aperture and circular disc, strip division of the wave front, straight edge, rectilinear propagation of light.

Resolving Power: Rayleigh criterion, resolving power of grating and prism systems, limit of resolution, resolving power of telescope and microscopic systems.

UNIT - III

Polarization: Polarized and unpolarized light, polarization by reflection, polarizing angle and Brewster's law, law of Malus, polarization by refraction, polarization by dichoric crystals, Optic axis, Polarization by double refraction, Huygen's theory of double refraction, Nicol prism, parallel and crossed polarizers, polaroids.

Interference of polarized light: Elliptically and circularly polarized light, retardation plates, Babinet's compensator, production and analysis of polarized light.

Rotary Polarization: Optical activity, rotary dispersion, Fresnel's explanation of rotation, specific rotation, Laurent's half shade and biquartz polarimeter.

UNIT-IV

Laser: Spontaneous and stimulated emissions, Einstein's coefficients, conditions for laser action, population inversion, pumping, 3 and 4 Level Systems.

Laser characteristics: spatial and temporal coherence, coherence length and coherence time, directionality, beam intensity, monochromaticity, Ruby laser, Helium-Neon gas laser,

Text and Reference Books:

Ajoy Ghatak, Physical Optics, Tata McGrew Hill Publications.

F. A. Jenkins and H. E. White, Fundamental of Optics, McGraw-Hill Publication.

D. P. Khandelwal, Optics and Atomic Physics, Himalaya Publishing House.

F. Smith and J. H. Thomson, Manchester Physics Series – Optics, John Wiley and Sons.

Born and Wolf; Principles of Optics, Cambridge Press.

B. K. Mathur and T. P. Pandya, Principles of Optics, Gopal Printing Press

B. B. Laud, Lasers, New Age Publication.

K. Thyagarajan, A. K. Ghatak: Lasers, Theory and Applications, Plenum Press, New York.

B. Sc. Part II: PAPER II- ELECTROMAGNETICS

UNIT-I

Electrostatics

Coulomb's law, Electric Field and potentials, Derivations of Poisson and Laplace Equations, Gauss Law and its application (Field due to a uniform charged sphere and conductor), Electrostatic energy of a charged uniform sphere, Electric monopole, dipole, quadrupole and their moment, Field and potential due to an electric dipole and quadrupole.

Dielectrics

Dielectric constant, polarization, Electronic polarization, Atomic or ionic Polarization Polarization charges, Electrostatic equation with dielectrics, Field, force and energy in Dielectrics.

UNIT-II

Magnetostatics

Magnetic field, Lorentz Force, Magnetic force on a current carrying wire, Biot-Savart Law, Divergence and curl of B, Ampere's Circuital theorem and its applications to calculate magnetic field due to wire carrying current and solenoid, Scalar and Vector magnetic potentials, Magnetic energy density, Magnetic field due to Magnetic Dipole.

Magnetic Properties of Matter

Intensity of magnetization and magnetic susceptibility, Properties of Dia, Para and Ferromagnetic materials, Curie temperature, Hysteresis and its experimental determination.

UNIT-III

Electromagnetic Induction

Laws of Induction: Faraday's laws and Lanz's Law, Mutual and Self Induction, Self and mutual inductance for solenoid, Induction of current in continuous media, Skin effect, Motion of electron in changing magnetic field , Betatron, Induced magnetic field (Time varying electric field), Displacement current, Equation of continuity, Modified Amperes law.

UNIT -IV

Electromagnetic Waves

Maxwell equations, Propagation of EM wave in free space, isotropic, anisotropic and conducting medium, Poynting vector, Poynting theorem, Boundary conditions, Reflection, refraction and total internal reflection of EM wave at a plane boundary of dielectrics, Polarization of EM wave.

Text and Reference Books:

1. Berkeley Physics Course; Electricity and Magnetism, Ed. E.M. Purcell (Mc GrawHill). Halliday and Resnik; "Physics", Vol 2.
2. D. J. Griffith; "Introduction to Electrodynamics" (Prentice-Hall of India).
3. Reitz and Milford; "Electricity and Magnetism (Addison-Wesley).
4. A. S. Mahajan and A A Rangwala; "Electricity and Magnetism" (Tata McGraw-Hill). A M Portis; "Electromagnetic Fields".
5. Pugh and Pugh; "Principles of Electricity and Magnetism" (Addison-Welsley).
6. Panofsky and Phillips; "Classical Electricity and Magnetism" (India Book House).
7. S. S. Atwood; "Electricity and Magnetism" (Dover).

B. Sc. II PAPER III - ELEMENTS OF QUANTUM MECHANICS, ATOMIC AND MOLECULAR 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, Complementary 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 properties of wave functions, One dimensional motion in step potential, Rectangular barrier, Square well potential, Particle in a box, Simple Harmonic Oscillator. (Qualitative)

UNIT - III

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.

UNIT -IV

Molecular spectra: Discrete set of electronic energies of molecules, quantisation of vibrational and rotational energies, determination of inter-nuclear distance, pure rotation and rotation- vibration spectra, Dissociation limit for the ground and other electronic states, transition rules for pure vibration and electronic vibration spectra.

Text and Reference Books:

H S Mani and G K Mehta; "Introduction to Modern Physics" (Affiliated East- West Press)

A Beiser, "Perspectives of Modern Physics".

H E White; "Introduction to Atomic Physics".

Barrow; "Introduction to Molecular Physics".

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

T A Littlefield and N Thorley; "Atomic and Nuclear Physics" (Engineering Language Book Society).

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

D P Khandelwal: "Optics and Atomic Physics", (Himalaya Publishing House)

B. Sc. II Physics Practicals Suggested List

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

1. Study of interference of light (biprism or wedge film).
2. Study of diffraction at a straight edge or a single slit.
3. Use of diffraction grating and its resolving limit.
4. Resolving limit of a telescope system.
5. Polarization of light by the reflection.
6. Study of optical rotation for any system.
7. Characteristics of a ballistic galvanometer.
8. Use of a vibration magnetometer to study a field.
9. Study of field due to a current.
10. Measurement of low resistance by Carey-Foster bridge or otherwise.
11. Measurement of inductance using impedance at different frequencies.
12. Measurement of capacitance using impedance at different frequencies.
13. Study of decay of currents in LR and RC circuits.
14. Response curve for LCR circuit and resonance frequency and quality factor.
15. Sensitivity of a cathode-ray oscilloscope.
16. Characteristic of a choke.
17. Measurement of inductance.
18. Study of discrete and continuous LC transmission lines.
19. Study of spectra of hydrogen and deuterium (Rydberg constant and ratio of masses of electron to proton).
20. Study of alkali or alkaline earth spectra using a concave grating.
21. Study of Zeeman effect for determination of Lande g-factor.
22. Analysis of a given band spectrum.
23. Study of Raman spectrum using laser as an excitation source

Text and Reference Books:

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

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PHYSICS

B. Sc. III

		Maximum Marks
Paper I	**Relativity and Statistical Physics**	**75**
Paper II	**SOLID STATE AND NUCLEAR PHYSICS**	**75**
Paper III	**SOLID STATE ELECTRONICS**	**75**
Practical	**Two practicals (50 Marks) + Viva (15 Marks) + Record (10 Marks)**	**75**
Total		**300**

Candidate must obtain minimum pass marks in Theory and Practical Examinations separately.

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B. Sc. III PAPER I: Relativity and Statistical Physics

Special Theory of Relativity

Unit I

Inertial and noninertial frames, Universality of Newton's second law in all inertial frames, Michelson-Morley experiment, Postulates for the special theory of relativity, Galilean transformation, Lorentz transformations, length contraction and time dilation with examples, velocity addition theorem, Time like, space like and light like intervals, Causality, Variation of mass with velocity, mass-energy equivalence, particle with a zero rest mass.

Unit II

Relativistic dynamics, relativistic energy, relativistic momentum, relation between energy and momentum, examples of decays, collisions and production of particles, Relativistic Doppler effect.

Statistical physics

Unit III

The statistical basis of thermodynamics: Probability, principle of equal a prior probabilities, probability distribution and its narrowing with increase in number of particles. 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. Probability and entropy, Boltzmann entropy relation. Statistical interpretation of second law of thermodynamics. Boltzmann canonical distribution law and its applications, Gibbs paradox, Law of equipartition of energy.

Unit IV

Maxwellian distribution of speeds in an ideal gas: Distribution of speeds and of velocities, distinction between mean, root mean square and most probable speed values.

Indistinguishability of particles and its consequences, Bose-Einstein statistics and black body radiation, Planck's law, Fermi-Dirac distributions, free electrons in a metal, Fermi level and Fermi energy.

Text and Reference Books:

A. Beiser, "Concepts of Modern Physics" (McGraw-Hill).

B. B. Laud, "Introduction to Statistical Mechanics" (Macmillan 1981).

F. Reif, "Statistical Physics" (McGraw-Hill 1988).

K. Haung, "Statistical Physics" (Wiley Eastern, 1988).

B. Sc. III 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.

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.

UNIT -III

General Properties of Nucleus: Brief survey of general Properties of the Nucleus, Mass defect and binding energy, Binding energy curves, charges, Size, Spin and Magnetic moment.

Nuclear Forces: Saturation phenomena and Exchange forces, Deuteron ground state properties. Nucleon-nucleon interaction, Yukava hypothesis, pi-meson exchange model.

Nuclear Models: Liquid drop model, Shell model of the nucleus, Magic numbers, Mirror nuclei, Bethe Weiszacker mass formula.

UNIT - IV

Radioactive Decays: Laws of radioactivity, decay constant, half life, mean life, activity, Geiger-Nuttal law, theory of successive transformation, Radioactive dating, Alpha decays, beta decays, gamma decays

Nuclear Reactions: Conservation laws, energetics, 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:

C. Kittel, "Introduction to Solid State Physics"- Vth Edition (John Wiley & Sons).

H. S. Mani and G. K. Mehta, "Introduction to Modern Physics"(Affiliated East-West Press— 1989).

A. Beiser, "Perspectives of Modern Physics".

T. A. Littlefield and N. Thoreley, "Atomic and Nuclear Physics" (Engineering Language Book Society).

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

Ghoshal S. N.- Nuclear Physics - S. Chand & Co.

B. Sc. III PAPER III: SOLID STATE ELECTRONICS

UNIT - I

Bloch theorem, Kronig Penney Model, Effective mass of electron, Allowed and forbidden energy bands, Fermi-Dirac distribution function, Carrier concentration in extrinsic semiconductor, Fermi level in intrinsic and extrinsic semiconductor. Drift and diffusion in semiconductors, Mobility and conductivity, Hall effect.

Width of depletion layer in PN junction, Junction potential, Temperature dependence of reverse saturation current and measurement of energy band gap of semiconductor, PN junction diode as a clipper (Positive, negative and mixed) and clamper.

UNIT – II

Base width modulation, Base spreading resistance, Ebers-Moll Model of transistor, DC and AC load lines, Thermal runaway, Thermal stability, Transistor as a switch.

Transistors at low frequency, Hybrid parameters, Input impedance, output impedance, current, voltage and power gain in terms of h-parameters for transistor CB, CE and CC amplifiers. Transistor Emitter follower, Cascading of amplifiers, RC Coupled amplifier and its analysis.

UNIT – III

Transistor as an oscillator, Tuned collector oscillator, Hartley and Colpitt's oscillators, Transistor power amplifiers, Class A and B operation, Heat sink.

Field effect transistor, JFET characteristics and parameters, JFET amplifiers, Voltage divider biasing circuit, FET as voltage variable resistor, Enhancement and depletion type MOSFET.

UNIT – IV

Digital Electronics: Decimal, Binary, Octal and Hexadecimal number system and conversion, Binary addition and subtraction, Laws and theorems of Boolean algebra, De-Morgan's theorems.

Logic Gates: AND, OR, NOT, NAND, NOR, X-OR gate, X-NOR gate, Half and Full adder.

Text and Reference Books:

Principles of Electronics by VK Mehta and R. Mehta, S. Chand & Com. Ltd., New Delhi, 2009.

Basic Electronics by B. L. Thareja, S. Chand & Com. Ltd., New Delhi, 1998.

Integrated Electronics: Analog and Digital Circuits and Systems by J. Millman and CC Halkias, McGraw-Hill Inc., 1988

Digital Principles and Applications by A. P. Malvino and D. P. Leach, Tata McGraw Hill.

Solid State Electronic Devices by BG Streetman, Prentice Hall

Suggested Practical List for B. Sc. III (Physics)

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

1. To determine the energy band gap of semiconductor using diode
2. To plot the characteristic I-V curves of a Zener diode.
3. To study characteristics of a PNP/NPN transistor in CB configuration.
4. To study characteristics of a PNP/NPN transistor in CE configuration.
5. To study the ripple and regulation of a half wave and full wave rectifier.
6. To study the ripple and regulation of a full wave rectifier using various filter circuits.
7. To study I-V characterises of LED's of different colours
8. The study frequency response curve of a RC coupled amplifier
9. To determine the value of Planck's constant using Photovoltaic cell
10. To study I-V characterises of FET
11. To measure temperature coefficient of resistance of a copper coil
12. To measure ratio (k/e) using transistor
13. To study a forward biased PN junction diode as a temperature sensor
14. Study of differentiating and integrating circuit using a CRO
15. To study characteristic curves of a solar cell
16. To study characteristic curves of a tunnel diode
17. To study temperature dependence of a thermistors
18. To measure h-parameters of a transistor
19. To study different methods of transistor biasing
20. To measure Hall coefficient of a given semiconductor
21. To determine e/m using Thomson method
22. To determine e/m using Helical method
23. To study Lissajous figures using CRO

24. To plot F-D distribution function in the neighbourhood of Fermi energy for different temperature values.
25. To measure wavelength of semiconductor diode/He-Ne laser using Plane transmission grating.
26. To measure wavelength of semiconductor diode/He-Ne laser using single slit diffraction pattern
27. To measure wavelength of semiconductor diode /He-Ne laser using Young's double slit experiment
28. To measure wavelength of semiconductor diode/He-Ne laser using a circular aperture
29. To measure wavelength of semiconductor diode /He-Ne laser using a biprism.
30. To measure the diameter of thin wire using laser
31. To measure intensity distribution within a laser beam
32. To measure angle of divergence of a laser pointer
33. To verify law of Malus using a laser.
34. To measure the refractive index of a transparent liquid using laser.

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