Department of Higher Education, Govt. of M.P.
Semester wise Syllabus for undergraduate
As recommended by Central Board of Studies and
approved by HE the Governor of M.P.

Class-B.Sc. I **Semester-I**
Subject- Physics **Paper - I**

Title- **Mechanics And Oscillations**

(The paper is divided in five units .Numerical problems must be asked)
Time - 3 hours MM – 50

Unit 1

Mechanics –I

Laws of motion, motion in a uniform field, components of velocity and acceleration in different coordinate systems. Uniformly rotating frame, centripetal acceleration, Coriolis force and its applications. Motion under a central force, Kepler's laws. (6 periods)

Unit.2

Mechanics –II

Gravitational law and field,. Potential due to a spherical body, Gauss & Poission's Equation of Gravitational self-energy System of. particles,, centre, of mass, equation of motion, conservation of linear and angular, momentum, conservation of energy, single stage and multistage rockets, elastic and inelastic collisions. (6 periods)

Unit.3

Oscillations

Potential well and. periodic oscillations, case of harmonic oscillations, differentia! equation and its solution, kinetic and potential energy, simple harmonic oscillations and its examples, spring and mass system, Vibrations of a magnet, oscillations of two masses connected by a spring. (6 periods)

Unit 4

Rigid Body Motion

Rigid body motion, rotational motion, moments of inertia and their products, principal moments and axes, Euler’s equations simple and compound pendulum tensional pendulum, bifilar oscillations, Helmholtz resonator,LC circuit. (6 periods)

Unit-5

Superposition Of Harmonic Motion –I

Superposition of two simple harmonic motions of the same frequency along the same line, interference, superposition of two mutually perpendicular simple harmonic vibrations of the

same frequency, Lissajous figures, case of different frequencies.
(6 periods)

Department of Higher Education, Govt. of M.P.
Semester wise Syllabus for undergraduate Classes
As recommended by Central Board of Studies and
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Class-B.Sc. I **Semester-I**

Subject- Physics **PAPER-II**

Title- Mathematical Background, Electrostatics, and Steady Currents

(The paper is divided in five units .Numerical problems must be asked)

Time - 3 hours MM - 50

Unit.1

Mathematical Background -I

Scalars and vectors, dot and cross products, triple vector product, gradient of scalar field and its geometrical Interpretation divergence and curl of a vector field, line, surface and volume integrals, flux of a vector field, Gauss's divergence theorem. Green's theorem and Stoke’s theorem. (6 periods)

Unit.2

Mathematical Background -II

Functions of two and three variables, partial derivatives, geometrical interpretation of partial derivatives of functions of two variables. Total differential of a function of two and three variables, higher order derivative,and,it's,applications.Repeated integrals of a function of more than one variable, definition of a double and triple integral ,evaluation of double and triple integrals as repeated integrals, change of variables of integration, Jacobian applications.

(6 periods)

Unit-3

Electrostatics -I

Coulombs law in vacuum expressed in vector forms, calculations of E for simple distributions of charge at rest, dipole and quadrupole fields.

Work done on a charge in an electrostatic field expressed as a line Integral, conservative nature of the electrostatic field. Electric potential ,$E = -\nabla$, torque on a dipole in a uniform electric field and its energy, flux of the electric field, Gauss's law and its application for finding E for symmetric charge distributions, Gaussian pillbox, fields at a surface of a conductor, screening of E field by a conductor. (6 periods)

Unit.4

Electrostatics -II

Capacitors, electrostatic field energy, force per unit area of the surface of a conductor in an electric field, conducting sphere in a uniform electric field, point charge in front of a grounded infinite conductor. Dielectrics, parallel plate capacitor with a dielectric, dielectric constant, polarization and polarization vector, and displacement vector D, molecular interpretation of Claussius-Mossotti equation, boundary conditions satisfied by E and D at the interface between two homogenous

: Dielectrics, illustration through a simple example. (6 periods)

Unit – 5

Electric Currents

Steady current, current density J, non-steady currents and continuity equation, Kirchoff ‘s laws and analysis of multiloop circuits, rise and decay of current in LR and CR circuits, decay constants, transients in LCR circuits.

(6 periods)

Department Of Higher Education, Govt. of M.P.
Semester Wise Syllabus For Under Graduates Classes
As recommended by Central Board of Studies and
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Class - B.Sc.I Semester – II
Subject - Physics Paper I
Title- Oscillations and Properties of Matter
Time - 3 hours MM – 50

Note: The Paper is divided in five units- Numerical problems must be asked.

Unit.l :

Superposition Of Harmonic Motion –II : Two coupled oscillators, normal modes, N coupled oscillators, damped harmonic oscillators, power dissipation, quality factor and their examples, driven harmonic oscillator; transient and steady states, power absorption, resonance in systems with many degrees of freedom.
(6Periods)

Unit.2 :

Properties of matter-I : Elasticity, small deformations, Hook's Law, elastic constants for an isotropic solid, beams supported at both the ends, cantilever, torsion of a cylinder bending moments and shearing forces. -
(6Periods)

Unit.3 :

Properties of matter-II : Kinematics of moving fluids, equations of continuity Euler's equation, Bernoulli's theorem , viscous fluids, streamline and turbulent flow, Poiseulle's law, Capillary tube flow, Reynold's number, Stokes law Surface tension and surface energy molecular interpretation of surface tension, pressure on a curved liquid surface wetting.
(6Periods)

Unit.4

Motion of charged Particles in Electric and Magnetic Fields –I :(note : *The emphasis here should be on the mechanical aspects and not on the details of the apparatus mentioned which are indicated as applications of principles involved.)*

E as an accelerating field, electron gun, case of discharge tube, linear accelerator. E as deflecting field- CRO, sensitivity of CRO. Transverse B field; 180° deflection, mass spectrograph or velocity selector curvatures of tracks for energy determination for nuclear particles; principles of a cyclotron.
(6Periods)

Unit.5 :

Motion Of charged Particles in Electric and Magnetic Fields -II :Mutually perpendicular E

and E fields- velocity selector, its resolution. Parallel E and B fields; positive ray parabolas, discovery of isotopes, elements of mass spectrographs, principle of magnetic focusing **(lenses).** (6Periods)

Department Of Higher Education, Govt. of M.P.
Semester Wise Syllabus For Under Graduate classes
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Class -	**B.Sc.I**	**Semester -II**	
Subject -	**Physics**	**Paper- II**	
Paper Title-	**Alternating Currents, magnetostatics and magnetic Theory** .		**Electro**
Time - 3 hours		MM – 50	

Unit- I

Electric Currents (Alternating) : AC circuits, complex numbers and their applications solving AC circuits Problems, complex impedance and reactance, series and parallel resonance., Q factor, power consumed by an A.C. circuit, power factor, Y and A networks and transmission of electric power.

Unit-II

Magnetostatics –I : Force on a moving charge: Lorentz force equation and definition of B, force on a straight conductor carrying current in a uniform magnetic field, torque on a current loop, magnetic dipole moment, angular momentum and gyromagnetic ratio,

Unit-III

Magnetostatics -II

Biot and Savart's Law, calculation of H for simple geometrical situations, Ampere's Law, ∇ X B = μ_0J, ∇.B=Q; Field due to a magnetic dipole magnetization current magnetization vector, Half order field, magnetic permeability (linear cases), interpretation of a bar magnet as *i* surface distribution of solenoidal current.

Unit- IV

Time Varying Fields : Electromagnetic induction, Faraday's Laws, electromotive force e = $\int$ E.dl., integral and differential forms of Faraday's laws. self and mutual inductance$_9$ transformers, energy in a static magnetic field. Maxwell's displacement current, Derivations of Maxwell's equations, electromagnetic field energy density., Poynting's vector

Unit-5

Electromagnetic Waves : The wave equation satisfied by E and B, plane electromagnetic waves in vacuum, 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,

Department Of Higher Education, Govt. of M.P.
Semester Wise Syllabus For Under Graduate Classes
As recommended by Central Board of Studies and
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Class - B.Sc.II Semester -III
Subject - Physics Paper -I
Paper Title- Kinetic theory, Thermodynamics And Lasers
Time - 3 hours MM – 50
Note: The Paper is divided in five units- Numerical problems must be asked.

Unit -1

Kinetic Theory of Matter –I : Ideal Gas; Kinetic model, deduction of Boyle's law, interpretation of temperature, estimation of rms. Speeds of molecules. Brownian motion, estimate of the Avogadro number, Equipartition of energy, specific heat of monatomic gas, extension to di and tri atomic gases, Behavior at low temperatures. Adiabatic expansion of an ideal gas, applications to atmospheric physics.
(6Periods)

Unit -2

Kinetic Theory of Matter –II : Real Gas; Vander Waals gas, equation, 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, Liquefaction of gases: Boyle temperature and inversion temperature. Principle of regenerative cooling,-liquefaction of hydrogen and helium. Refrigeration cycles, meaning of efficiency.

(6Periods)

Unit -3

Thermodynamics – I : 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, 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. (6Periods)

Unit -4

Thermodynamics-II : Thermodynamic relationship : Thermodynamic variables, extensive and intensive, Maxwell general relationship application to joule – Thomson cooling and adiabatic cooling in a general system Clausius Clapeyron heat equation. Thermodynamic potentials of thermodnamical system relation with thermodynamical variables. Cooling due

to adiabatic demagenetization, Production and measurement of very low temperatures.
(6Periods)

Unit V

Laser : Laser system: Purity of a spectral 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. Pulsed lasers and tunable lasers, spatial coherence and directionality, estimates of beam intensity, temporal coherence and spectral energy density. Lasers and nonlinear optics polarization 'P' including higher order terms in ^{4}E' and generation of harmonics momentum, mismatch and choice of the right crystal and direction for compensation. (6Periods)

Department Of Higher Education, Govt. of M.P.
Semester Wise Syllabus For Under Graduate Classes
As recommended by Central Board of Studies and
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Class - B.Sc.II Semester -III
Subject - Physics Paper- II

Paper Title- Waves, Acoustics and Geometrical Optics

Note : The paper is divided in five Units. Numerical problems must be asked.
Time - 3 hours MM – 50

Unit-I

Waves-I : Waves in Media : Speed of transverse waves on a uniform string, speed of longitudinal waves in a fluid, energy density and energy transmission in waves, typical measurements. Waves over liquid surface : gravity waves and ripples Group velocity and phase velocity, their measurements (6 Periods)

Unit -II

Waves-II : Superposition of waves : Linear homogeneous equation and the superposition principle, non linear superposition and consequences. Standing waves : Standing waves as normal modes of bounded systems, examples,. Harmonics and the quality of sound ; Chaldni's figures and vibrations of a drum. Production and detection of ultrasonic and instrasonic waves and applications.

(6 Periods)

Unit - III

Acoustics-I : Noise and Music ; The human ear and its responses ; limits of human audibility, intensity and loudness, bel and decibel, the musical scale, temperament and musical instrument. Reflection, refraction and diffraction of sound.

(6 Periods)

Unit - IV

Acoustics-II : Acoustic impedance of a medium, percentage reflection and refraction at a boundary, impedance matching for transducers, diffraction of sound, principle of a sonar system ranging. Applied acoustics : Transducers and their characteristics, recording and reproduction of sounds, various systems, Measurements of frequency, waveform, intensity and velocity. The acoustics of halls, reverberation period, Sabine's formula. (6 Periods)

Unit - V

Geometrical Optics: Fermat's Principle of extremum path, the aplantic points of a sphere and other applications. General theory of image formation : cardinal points of an optical system, general relationship, lens and lens combinations, Lagrange equation of magnification, telescopic combinations, telephoto lenses and eyepieces.

(6 Periods)

Department Of Higher Education, Govt. of M.P.
Semester Wise Syllabus For Under Graduates
As recommended by Central Board of Studies and
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Class - B.Sc.II Semester - IV
Subject - Physics Paper –I
Paper Title- Statistical Physics

Note : The paper is divided in five Units. Numerical problems must be asked.
Time - 3 hours MM – 50

Unit I

Statistical Physics-I : The statistical basis of thermodynamics: Probability and thermodynamic probability, principle of equal a priori probabilities, probability distribution and its narrowing with increase in number of particles. The expressions for average properties. Constrains, accessible and inaccessible states, distribution of particles with a given total energy into a discrete set of energy states. Some universal laws: The μ space representation, division of μ space into energy sheets and into phase cells of arbitrary size, applications to one-dimensional harmonic oscillator and free particles. Equilibrium between two systems in thermal contact, bridge with macroscopic physics.
(6Periods)

Unit II

Statistical Physics-II : 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. Maxwellian distribution of speeds in an ideal gas: Distribution of speeds and of velocities, experimental verification, distinction between mean, rms. and most probable speed values. Doppler broadening of spectral lines. (6Periods)

Unit III

Black Body Radiation : Spectral distribution of BB radiation. Wien's displacement law,Rayleigh-Jean'slaw,the ultraviolet catastrophy, Planck's quantum postulates, Planck's law, complete fit with experiment. Interpretation of behaviour of specific heats of gases at low temperature . (6Periods)

Unit IV

Quantum Statistics : Transition to quantum statistics: “h” as a natural constant and its implications$_9$ cases of particle in a one dimensional box and one-dimensional harmonic oscillator. Indistinguishability of particles and its consequences, Bose-Einstein and Fermi-

Dirac conditions; applications to liquid helium, free electrons in a metal,-and photons, in blackbody chamber. Fermi level and Fermi energy. (6Periods)

Unit V

Transport Phenomena : Transport phenomena is 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.

(6Periods)

Department Of Higher Education, Govt. of M.P.
Semester Wise Syllabus For Under Graduate
As recommended by Central Board of Studies and
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Class - B.Sc.II Semester - IV
Subject - Physics Paper – II
Paper Title- Optics

Note : The paper is divided in five Units. Numerical problems must be asked.
Time - 3 hours MM – 50

Unit - I

Geometrical Optics-II : Aberration in images: Chromatic aberrations, achromatic combination of lenses in contact and separated lenses. Monochromatic aberrations and their

reductions; aspherical mirrors and Schmidt corrector plates, aplanatic points, oil immersion objectives, meniscus lens. Optical instruments: Entrance and exit pupils, need for a multiple lens eyepiece, common types of eyepieces. (6Periods)

Unit - II

Interference I : Interference of light: The principle of superposition, two-slit interference, coherence requirement for the sources, optical path retardations, lateral shift of fringes, Rayleigh refractometer and other applications. Localised fringes; thin films, applications for precision measurements for displacements. Haidinger fringes: Fringes of equal inclination. (6Periods)

Unit - III

Interference II : Michelson interferometer, its application for precision determination of wavelength, wavelength difference and the width of spectral lines. Twymann-Green interferometer and its uses, Intensity distribution in multiple beam interference, Tolansky fringes, Fabry-Perot interferometer and etalon . (6Periods)

Unit - IV

Fraunhoffer Diffraction: Fraunhoffer diffraction; Diffraction at a slit, half-period zones, phasor diagram and integral calculus methods the intensity distribution, diffraction at a circular aperture and a circular disc, resolution of images, Rayleigh criterion, resolving power of telescope and microscopic systems. outline of phase contrast microscopy. Diffraction gratings: Diffraction at N parallel slits, intensity distribution, plane diffraction grating, reflection grating and blazed gratings. Concave grating and different mountings. (6Periods)

Unit - V

Diffraction & Polarization : Resolving power of a grating and comparison with resolving powers of prism and of a Fabry-Perot etalon. Double refraction and optical rotation: Refraction, in uniaxial crystals, its electro magnetic theory. Phase retardation plates, double image prism. Rotation of plane of polarization, origin of optical rotation in liquids and in crystals (6Periods)

Department of Higher Education, Govt. of M.P.
Semester wise Syllabus for undergraduate Classes
As recommended by Central Board of Studies and
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Class-B.Sc. III **Semester -V**

Subject- Physics paper –I

Paper Title - Relativity, Quantum Mechanics, Atomic Physics

(The paper is divided in five units .Numerical problems must be asked)

Time - 3 hours MM – 50

Unit 1

Theory of Relativity

Reference systems, inertial frames, Galilian 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 zero rest mass. (6Periods)

Unit 2

Origin of Quantum Theory:

Failure of classical physics to explain the phenomena such as a black-body spectrum. photoelectric effect Ritz combination principle in spectra. stability of an atom Planck's radiation law, Einstein's explanation of photoelectric effect. Bohr’s quantization of angular momentum and its application to hydrogen atom, limitations of Bohr's theory. (6Periods)

Unit 3

Quantum Mechanics- I

Wave-particle duality and uncertainty principle de Broglie's hypothesis for matter waves; the concept of wave and group velocities, evidence for diffraction and interference of particles, experimental demonstrations of matter waves. Consequence of de Brogile's concepts; quantization in hydrogen atom; energies of a particle in a box, wave packets, Heisenberg's uncertainty relation for p and x, its extension to energy and time. (6Periods)

Unit -4

Quantum Mechanics-II

Consequence of the uncertainty relation; gamma ray microscope , diffraction at a slit particle in a box, position of an electron in a Bohr's orbit, Schrödinger's equation. Postulatory basis of quantum .mechanics; operators, expectation values, transition probabilities, applications to a particle *m* one and three dimensional boxes, harmonic oscillator, reflection at a step potential, transmission across a potential barrier. (6Periods)

Unit -5

Atomic Physics-

Hydrogen atom; natural occurrence of n, 1 and m quantum numbers, the related physical quantities. Comparison with Bohr's theory.
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 . (6Periods)

Department Of Higher Education, Govt. of M.P.
Semester Wise Syllabus For Under Graduate
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Class - B.Sc.III Semester -V
Subject - Physics paper – II
Paper Title- Solid State Physics
(The paper is divided in five units .Numerical problems must be asked)
Time - 3 hours MM – 50

Unit I:

Crystal Structure : Overview: Crystalline and glassy forms, liquid crystals, glass transition Structure: Crystal structure: periodicity, lattices and bases, fundamental translation vectors, unit cell Wigner-Seitz cell allowed rotations, lattice types, lattice planes. Common crystal structures. Laue's theory of X-ray diffraction, Bragg's law, Laue patterns. (6 Periods)

Unit II

Bonding of Atoms and Magnetism : Bonding: Potential between a pair of atoms; Lennard-Jones potential , concept of - cohesive energy, covalent, Vander Waal, ionic and metallic crystals. Magnetism: Atomic magnetic moment magnetic susceptibility, Dia, Para and Ferromagnetism Ferro magnetic domains. Hysteresis.
(6 Periods)

Unit III

Lattice Vibration : Thermal properties: Lattice vibrations, simple harmonic oscillator, second order expansion of Lennard-Jones potential about the minimum, vibrations of one dimensional mono atomic chain under harmonic and nearest neighbour interaction approximation. Concept of phonons, density of modes (1-D) Debye model; Lattice specific heat low temperature limit, extension (conceptual) to 3-D. (6Periods)

Unit IV

Band Structure : Motion of electrons: Free electrons, conduction electrons, electron collisions, mean free path, conductivity and Ohm's law. Density of states. Fermi energy, Fermi velocity, Fermi-Dirac distribution. Band structure: Electrons in periodic potential; nearly free electron model (qualitative), energy band, energy gap, metals, insulators, semiconductors. (6 Periods)

Unit V

Semiconductors : Semiconductors : Intrinsic-semiconductors, electrons and holes, Fermi Level , Temperature dependence of election and hole concentrations. Doping: impurity states, n and p type semiconductors. conductivity, mobility, Hall Effect, Hall Coefficient. (6 Periods)

Department Of Higher Education, Govt. of M.P.
Semester Wise Syllabus For Under Graduate
As recommended by Central Board of Studies and
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Class - B.Sc.III Semester -VI
Subject - Physics Paper- I
Paper Title- Atomic, Molecular and Nuclear Physics

(The paper is divided in five units .Numerical problems must be asked)

Time - 3 hours MM – 50

Unit – I

Atomic physics –II

Continuous X-ray spectrum and its dependence on voltage, Duane and Hunfs law. Characteristic X-rays. Moseley's law; doublet structure of X-ray spectra.X-ray absorption spectra. (6 Periods)

Unit - II:

Molecular Spectral : Discrete set of electron-: energies of molecules, quantization of vibration and rotational energies, determination of inter nuclear distance, pure rotational and rotation-vibration spectrum Dissociation limit for the ground and other electronic states, transition rules for pure vibration and electronic vibration spectra. (6 Periods)

Unit – III

Spectroscopy : Raman Effect, Stokes and anti-stokes lines, complimentary character of Raman and infrared spectra, experimental arrangements for Raman Spectroscopy. Spectroscopic techniques Source of excitation, prism and grating spectrographs for visible, UV and IR, absorption spectroscopy, double beam instruments, different recording systems.
(6 Periods)

Unit- IV

Nuclear Physics-I : Interaction of charged particles and neutrons with matter, working of nuclear detectors, G-M counter, proportional counter and scintillation counter, cloud chambers, spark chamber, emulsions technique.
Structure of nuclei, basic properties (I, (μ, Q and binding energy), deuterium binding energy, p-p and n-p scattering and general concepts of nuclear forces.

(6 Periods)

Unit- V

Nuclear Physics- II : Beta decay, range of alpha particle, Geiger-Nuttai law. Alpha Decay &

Gamow's explanation alpha decay and continuous and discrete spectra. Nuclear reactions, channels, compound nucleus, direct reaction (concepts).Shell model: Liquid drop model fission and fusion (concepts), energy production in stars by p-p. and carbon - nitrogen cycles (concepts (6 Periods)

Department Of Higher Education, Govt. of M.P.
Semester Wise Syllabus For Under Graduate

As recommended by Central Board of Studies and
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Class - B.Sc. III Semester -VI

Subject - Physics Paper - II

Paper Title- Solid State Devices and Electronics

(The paper is divided in five units .Numerical problems must be asked)

Time - 3 hours MM – 50

Unit I

Semiconductor devices: Metal-semiconductor junction, p-n junction, majority and minority carriers, diode, Zener and tunnel diodes, light emitting diode, transistor solar cell. Power supply: Diode as a circuit element, load line concept, rectification, ripple factor Zener diode, voltage stabilization, IC voltage regulation. (6 Periods)

Unit II

Transistors : Characteristics of a transistor in CB, CE and CC mode, graphical analysis of the CE configuration, low frequency equivalent circuits, h-parameters, bias stability, thermal runaway.

FETs: Field effect transistors: JFET volt-ampere curves, biasing JFET. ac. operation of JFET, source follower. (6 Periods)

Unit III

Amplifiers–I : Small signal amplifiers : General Principle of operation, classification , distortion RC coupled amplifier, gain frequency response , input and output impedance, multistage amplifiers. (6 Periods)

Unit IV

Amplifiers- II : Transformer coupled amplifiers, Equivalent circuits at low, medium and high frequencies, emitter follower, low frequency common source and common drain amplifier, Noise in electronic circuits. (6 Periods)

Unit V

Oscillators: Feedback in amplifiers, principle, it's effects on amplifiers, characteristics. Principle of feedback amplifier, Barkhausen criteria, Hartley Colpitt and Wein bridge oscillators. . (6 Periods)

B.Sc First & Second Semester
List of Projects

1. **Study of motions in inclined plane.**
2. **Study of motion under central force.**
3. **Study of Kepler's third law with reference to solar system.**
4. **Study of Springs.**
5. **Study of Collisions**
6. **Study of various setelites launched by India.**
7. **Study of various types of oscillators**
8. **Study of motion of hollow & solid bodies.**
9. **Study of of Stoke's theorem for atleast 5 applications (Consider different branches of Physics)**
10. **Study of of Green's theorem for atleast 5 applications (Consider different branches of Physics)**
11. **Study of of Gauss's theorem for atleast 5 applications (Consider different branches of Physics)**
12. **Design and study of R-C Circuit.**
13. **Design and study of L-R Circuit.**
14. **Study of elastic limits for different materials.**
15. **Theoritical study of working of different fluorescent lamps.**

B.Sc Third & Fourth Semester
List of Projects

1. **Study of Van-der Wall constants for different gases.**
2. **Study of critical constants.**
3. **Comparative study of 4- stroke and 2- stroke engines.**
4. **Study of factors governing the power requirement of an A.C.**
5. **Study of acoustics parameters related to a room**
6. **Study of various types of transducers.**
7. **Study of coherence properties of lasers.**
8. **Study of various types of emission.**
9. **Study of non-linear polarization.**
10. **Study of different broadening mechanism of spectral lines.**

11. Study of different types of microscopes.
12. Study of different types of eye – pieces
13. Theoretical study of optical aberrations.
14. Study of non linear crystals.
15. Study of ultrasonic waves.

B.Sc Fifth & Sixth Semester
List of Projects

1. Design of an application of photo-electric cell.
2. Design of band gap energy measurement apparatus.
3. Comparative study of electron diffraction and X-ray Diffraction for crystal structure measurement.
4. Study of different techniques of crystal growth.
5. Study of p-n junction diode, zener diode, tunnel diode with reference to their doping.
6. Fabrication of apparatus for transistor characteristics study.
7. Study of various types of resistors available in the market.
8. Study of various types of capacitors available in market.
9. Fabrication of apparatus for study of different types of diodes.
10. Study of design of apparatus for FET characteristics.
11. Study of design of a cascade amplifier.
12. Study and design of unregulated power supply
13. Study and design of regulated power supply.
14. Study and design of an oscillator circuit.
15. Study of working of a telephone exchange.
16. Study of working of a power sub station.
17. Study of transmission through optical fiber.
18. Study of working of a radio station.
19. Study of any physics or electronics training centre includes UTD / USIC .

REFERENCE BOOKS

1. Model Physics : R.P. Goyal
2. Modern Physics : R Murugeshan, K. Shiva Prasath (S. Chand and Co.)
3. Nuclear Physics : Pandya Yadav
4. Atomic Physics : J B Rajam
5. Optics and Atomic Physics D.P. Khandelwal
6. Quantum Physics of Atoms, Molecules ,Solids, Nuclear and Particles:Eisenberg and Resnik : John Wiley and sons.
7. Quantum mechanics : Satya Prakash
8. Introduction to Molecular Physics :Barrow
9. Introduction to Modem Physics. H.S. Maui and G.K. Mehta
10. Prospective of Modem Physics : Beiser,
11. Introduction *to* Atomic Physics : HE. White
12. Introduction to Molecular Physics : Barrows
13. The Feymann Lectures on Physics Vol. Ill : R.P. *Feymann*, RB. Leighton *and* M. Sands
14. Atomic and Nuclear Physics : T. A. Littlefield and N. Thorley
15. Introduction to Nuclear Physics H. A. Enge
16. Introduction to Solid State Physics C. Kittel
17. Solid State Physics : R.L, Singhal
18. Micro Electronics J- Millman and A. Grabel
19. Electronic Devices and Circuits : Millman Halkias
20. Electronic Devices Circuits and Applications : J.D. Ryder
21. Electronic Devices and Circuits: Robert Baylested and Louis Nashelsky

B.Sc. First semester
List of Practicals

For Regular Students

Practical I	Sessional	Viva	Total
25	10	15	50

For Ex - Student

Practical I	Sessional	Viva	Total
35	0	15	50

1. Study of laws of parallel and perpendicular axes for moment of inertia.
2. Study of a compound pendulum.
3. Study of damping of a bar pendulum under various mechanics. *
4. Study of oscillations under a bifilar suspension.
5. Study of bending of a cantilever or a beam.
6. Study of torsion of a wire (static and dynamic methods)
7. Use of a vibration magnetometer to study a field,
8. Study of B field due to a current.
9. Study of decay of currents in LR and RC circuits.

B.Sc. Seccond semester
List of Practicals

For Regular Students

Practical I	Sessional	Viva	Total
25	10	15	50

For Ex - Student

Practical I	Sessional	Viva	Total
35	0	15	50

1. Study of conservation of momentum in two dimensional oscillations.
2. Potential energy curves of a 1-Double system and oscillations in it for Various amplitudes.
3. Study of oscillations of mass under different combinations of springs.
4. Study of flow of liquids through capillaries.
5. Determination of surface tension of a liquid by different methods. '
6. Study of viscosity of a fluid by methods.
7. Characteristics of a ballistic galvanometer
8. Setting up and using an electroscope or electrometer.
9. Measurement of low resistance by Carey-Foster bridge or otherwise;
10. Measurement of inductance using impedance at different frequencies.
11. Measurement of capacitance using, impedance at different frequencies.
12. Response curve for LCR circuits and response frequencies. j
13. Sensitivity of a cathode- ray oscillatoscope

B.Sc. Third Semester
List of Practicals

For Regular Students

Practical I	Sessional	Viva	Total
25	10	15	50

For Ex - Student

Practical I	Sessional	Viva	Total
35	0	15	50

1. Study of conversion of mechanical energy into heat
2. Heating efficiency of electrical kettle with varying voltages.
3. Study of temperature dependence of spectral density of radiation
4. Resistance thermometry
5. Thcrmo-cmf thermometry
6. Conduction of heat through poor conductors of different geometries
7. Speed of waves on a stretched string
8. Measurement of sound intensities with different situation
9. Characteristics of a microphone H- loudspeaker system
10. Study of laser as a monochromatic coherence source

B.Sc. Fourth Semester
List of Practicals

For Regular Students

Practical I	Sessional	Viva	Total
25	10	15	50

For Ex - Student

Practical I	Sessional	Viva	Total
35	0	15	50

1. Experimental study of probability distribution for a two-option system using a coloured dice
2. Study of.statistical distributions on nuclear' disintegration data
3. Study of interference using biprism.
4. Study of differaction at straight edge.
5. Use of differaction grating and it's resolving limit.
6. Resolving power of telescope.
7. Polarisation by reflection.
8. Stydy of optical rotation.
9. Percentage of absorption of light by photometer.
10. Refractive index and dispersive power of prism using spectrometer.

B.Sc. Fifth Semester
List of Practical's

For Regular Students

Practical I	Sessional	Viva	Total
25	10	15	50

For Ex - Student

Practical I	Sessional	Viva	Total
35	0	15	50

1. Determination of Planck's constant
2. Determination of e/m using Thomson's method
3. Determination of e by Millikan's method.
4. Study of spectra of hydrogen and deuterium (Rydberg constant and ratio of masses electron to proton.
5. Absorption spectrum of iodine vapour
6. Study of alkali or alkaline earth spectra using concave grating
7. Study of Zeeman effect for determination of Lande g-factor.
8. Analysis of a given band spectrum
9. Study of Raman spectrum using laser as an excitation source
10. Study of crystal faces

B.Sc. Sixth Semester
List of Practicals

For Regular Students

Practical I	Sessional	Viva	Total
25	10	15	50

For Ex - Student

Practical I	Sessional	Viva	Total
35	0	15	50

1. Characteristic of a transistor.
2. Characteristic of a tunnel diode
3. Hysteresis curve a transformer core.
4. Hall probe method for measurement of resistivity
5. Specific resistance and energy gap of a semiconductor
6. Study of voltage regulation system
7. Study of regulated power supply
8. Study of Lissajos figures using a CRO
9. Study of VTVM
10. Study of RC coupled amplifiers