M.SC. (Physics) Br. IV (C) Non-Semester

FIRST YEAR PAPER –1

MATHEMATICAL PHYSICS

Unit- I Vectors : Gauss's Theorem - Green's Theorem - Stoke's Theorem Statements and proofs. Applications - curvilinear coordinates - cylindrical and spherical polar coordinates.

Tensors : Coordinate transformation - Covariant and Contra variant Tensors - Tensors of higher ranks Addition, multiplication and contraction of tensors - quotient of tensors - metric tensor.

Matrices: Special matrices (orthogonal - unitary and hemitian). Properties and applications Diagonalization - eigen values and eigen functions - Cayley - Hamilton theorem - applications. Group theory : Definition - axioms - concepts of a subgroup and class -multiolication table - matrix representation. Unit- II

Infinite Series. Convergence and divergence series - comparison test - Cauchy's ratio test - Ceuchy's integral test - absolute convergence and uniform convergence weierstrass M test- Evaluation of a function taking an indeterminate form.

Fourier Series : Definition expansion in trigonometric functions - sine and cosine series convergence in the mean - complex of Fourier series - Applications. Beta and Gamma functions, Definitions, properties and applications. Dyse Delta function : Definition representations - properties. Unit-III Complex variables: Analytic functions - Cauchy - Riemann conditions Morera theorem - Cauchy's integral formula, Taylor and Laurent's series - zeroes and singularities - Residual theorem and applications. Fourier Transforms: Definitions Properties - Sine and Cosine transforms applications

unit - IV Special Funcitons : Sturm - Liouville DE - Power series method of solution Bessel, Hermite, Legendre and Laguerre DE - Generating functions for legendre's then Polynomials simple recurrence relations Rodrigues formulae. Unit - V Partial Differential Equations : The strectched string - wave equation solution is the method of separation of variables - simple applications. Green's Functions Non homogeneous PDE - Green's functions in terms of eigen functions, Solutions of the non homogeneous PDE in terms of Green's function - simple applications.

Reference Book:

1. Mathematical Physics, Eugene Butkov, Addison - Wesley.

2. Applied mathematics for Engineers and Physicists, L.A. Pipes and L.R. Harvill, III Edition - McGraw Hill.

3. Mathematical methods for physics, J. Mathews and R.L. Walker, Benjamin Press.

4. Mathematical Methods for Physicists, G. Arfken and J. Weber, IV edition, Academic Press and Prism Books (1995).

5. Mathematical Physics, B.D. Gupta, II revised edition, Vikes publishing house (1996).

6. Mathematical Physics, B.S. Rajput and Y. prakash, XXI edition, Pragathi Prakasan (1997)

7. Advanced Engineering Mathematics, Erwin Kreyszig, IV Edition. New Age International (1996).

FIRST YEAR PAPER –II

CLASSICAL AND STATISTICAL MECHANICS

UNIT – I

Mechanics of a particle and system of particles – constraints – D'Alembert's Principle - Lagrange's equations – Velocity dependence potentials, dissipation function, applications of Lagrange's formalism.

Hamilton's principle – calculus of variations – Lagrange's equation from the Hamilton's principle –

nonholonomic systems – Advantages of variational principle formulation – conservation theorems and symmetric properties.

UNIT–II

Reduction of two body problems into one body and equivalent one dimensional problems - equations of motion and first integrals, virial theorem, differential equations for orbit integrable power law potential, Bertrand's theorem, Kepler's problem – Laplace Range – Lenz vector, scattering in a central force field, transformation of the scattering to kb coordinates.

Independent coordinates of rigid body, matrix transformation – Eculer angles, Eulur theorem on rigid body motion, finite rotations, infinitesimal rotations, rate of change of a vector, Coriolis force.

UNIT – III

Angular momentum and kinetic energy – solving Eulers equations, torque free motion, symmetrical top and precession – influence of magnetic field.

Small oscillations – formulation, normal coordinates, eigen values, linear matomic molecule, forced vibrations and dissipative forces.

Hamilton equations of motion and Legendre transformations. Cyclic coordinates arid conservation theorems, Rouths procedure, Principle of least action, Hamilton's equations from variational principle.

UNIT – IV

Canonical transformation – examples – symplectic approach, Poisson brackets –Canonical invariants – Poisson bracket formulation for equations of motion – infinitesimal canonical transformations and

conservation theorems, Hamilton Jacobi theory – harmonic oscillator as an example, Hamilton's characteristic function, separation of variables –

action angle variables, Kepler's problem as an example.

UNIT – V

Statistical thermodynamics – Energy states and energy levels, micro and macrostate, thermodynamic probability, B.E, F.D M B statistics, entropy, B.E. F.D and classical distribution function and their comparison, M.B. distribution function, Partition function, thermodynamic properties.

Application of statistics to gases – monoatomic ideal gas distribution of molecular velocities, experimental verification of M.B speed distribution,

ideal gas in gravitations–field – equipartition energy – linear oscillator – specific heat of diatomic gas, Paramagnetism – negative temperature – the electron gas.

Fluctuations: Mean Square Deviation, Fluctuations in ensembles, Fluctuations Quantum Statistics – Random Walk – Brownian motion – Electrical Noise.

Books for Reference:

1. Classical Mechanics – Herbert Goldstein, II edition. Narosa Publishing house.

2. Thermodynamics , Kinetic theory and Statistical

Mechanics –F.W. Sears and G.L. Salinger, III edition, Narosa Publishing House.

3. Statistical Mechanics – B.K. Agarwal and Melvin Eisner, Willey Eastern, II edition 1991.

4. Statistical and Thermal Physics – Federick Reif, Me. Graw Hill, 1965.

5. Classical Mechanics – K.C. Gupta, New Age Publishers.

6. Classical Mechanics – V.B. Bhatia, Narosa Publishing house, 1997.

7. Classical Mechanics – N.C. Rana and P.S. Joag, TMH, 1994.

8. Classical Mechanics – B.D.Gupta, Satya prakash, Kedamath Ramnath, 2000.

9. Modern physics – R.Murugesan, S.Chand and company,

10. Classical Mechanics – Gupta, Kumar Sharma, Pragatiprakashan, X Edition. 1989.

FIRST YEAR PAPER –III

ELECTROMAGNETIC THEORY

Unit – I

Columbo's law, electric field, electrostatic potential, conductors and Insulators, Gauss law and its applications, the electric dipole, Multipole expansion. Poisson's equation and Laplace's equation, Laplace's equation in oneindependent variable, soultion to Laplace's, equation in spherical polar coordinates – Zonal harmonics,

Boundary value problems in electrostatics, conducting sphere in a uniform electric field, Laplace's equation in plane polar coordinates. Method of images point charges and a conducting sphere, Line charges and line images.

Unit – II

Polarization – electric field in the presence of a dielectric medium, Gauss law in a dielectric and the electric displacement vector. Electric susceptibility and dielectric constant, Point charge in a dielectric fluid, Boundary conditions on the field vectors at the interface of two different media, Boundary - value

problems involving dielectrics, Dielectric sphere in a uniform electric field. Potential energy of a system of point charges and that of a charge distributions Energy density of a system of point charges and that of a charge distributions. Energy density of an electrostatic field, Energy of a system of conductors and coefficients of potential, Force of a dielectric slab partially introduced in an electric field.

Unit – III

The definition of magnetic induction, Forces on current carrying conductors, Biol and Savart's law and its elementary application. Ampere's

circuital law, the magnetic vector potential. The magnetic field of a distant circuit, the magnetic scalar potential and magnetic flux.

Magnetization, the magnetic field produced by a magnetic material, magnetic scalar potential and magnetic pole density - The sources of magnetic field, Magnetic intensity. The field equations, Magnetic susceptibility and permeability, Boundary conditions of field vectors.

Electromagnetic induction, Magnetic energy of coupled circuits, energy density electric field, forces and torques of rigid circuits. Electrical neutrality in a plasma, particle and

drift motion in a plasma, Magnetic mirrors, Magnets hydrodynamic hydromagnetic) equations, Alfven waves, the pinch effect, magnetic confinement for thermonuclear fusion - Plasma oscillations, and wave motion, the use of for plasma measurements.

Unit – IV

Generalization of Ampere's law, displacement current - Maxwell's equation and electromagnetic energy - The wave equation with and without sources - Plane monochromatic wave in non conducting media, Polarization of electromagnetic waves, Energy density end flux, Plane

monochromatic waves in conducting media.

Reflection and refraction at the boundary between two nonconducting media - Normal incidence and oblique incidence, Brewster's angle, critical angle. Complex Fresnel coefficients - reflection from a conducting plane, Reflection and transmission by the layers, Interference. Propagation between parallel conducting plates, wave guide resonators.

Optical dispersion - Drude - Lorentz model, Resonance absorption by quasielasticity bound charges, The Drude free electron theory.

Unit – V

Radiation from an oscillating dipole, Radiaiton from a half-wave antenna. Radiation from a group of moving charges, induction zone and intermediate zone fields. Radiation damping - Thomson cross section.

Linenard - Wiechert potentials. The field of a uniformly moving point charge. The field of an accelerated point charge. Radiation fields for small velocities.

Einstein's postulates of special theory of relativity and Lorentz transformation, Geometric interpretation of Lorentz

transformation. Transformation equations for velocity, the Lorentz transformation of a four vector. Some tensor relations useful in special relativity, Covariant form of elctromagnetic equations, Transformation law for the electromagnetic field.

Books for Reference:

1. Foundations of Electromagnetic Theory, J.R. Reitz, FJ. Milford and R.W. Christy -III Edition, Narosa Pub. House, New Delhi, 1990.

2. Classical Electricity and Magnetism, W.K.J. Panofsky and M.Phillips, Add Wesley, 1962.

3. Electromagnetic fields and Waves, Paul Lorrain and Dale R.Corson, II edition, CBS Publishers, 1986.
4. Introduction to Electrodynamics - David J.Grifths, PHI.

5. Classical Electrodynamics J.D.Jackson, Wiley Western

FIRST YEAR PAPER –IV

OPTICS AND SPECTROSCOPY

UNIT – I

Nature of Light -Speed of light – Propagation of electromagnetic waves – Phase velocity - Group Velocity – Energy flow – Poynting vector. Polarization: Linear, circular and elliptical. The jones matrix representation –Fourier transform Spectroscopy – Multiple beam interference – Fabry Perot interferometer and its resolution.

Multilayer film coating and applications.

UNIT - II

Theory of diffraction – Fraunhofer and Fresnel diffraction with illustrative examples. Aperture functions and Fourier transform – Apodization – Spatial filtering. Phase contrast and Phase Gratings – Holography (Basic principle only) –wave propagation in crystals – Wave Vector surface – double refraction – optical activity and theory – Faraday rotation in solids – Kerr Electrooptic effect Qualitative concepts of the cotton – Moutan effect – Pockels effect –Non– linear

optics – Lasers –Optical resonator theory – Various types of lasers.

UNIT - III

Region of electromagnetic spectrum – Representation of spectra – The width end intensity of spectral transitions – Rotation of molecules (rigid and non rigid diatomic rotator – microwave spectrometer – Vibration of a diatomic – Diatomic vibrating rotator - vibrations of polyatomic molecules – effect of nuclear spin – Classical and quantum theory of Raman effect – Rotational Ramon spectra (linear) – Structural determination using IR and Raman.

UNIT – IV

Modern Raman Spectrometer – Atomic Quantum number – Atoms with one electron – Atoms with many electrons – Equivalent and non equivalent electrons – Zeeman effect – Electronic spectra of diatomic molecules –Vibrational and rotational structure of electronic spectra, determination of molecular structure.

UNIT V

Resonance Spectroscopy: Nuclear Magnetic Resonance (NMR): Resonance condition, NMR Instrumentation, Relaxation process, Bloch equations, Dipolar Interaction,

Chemical Shift, Indirect spin-spin Interaction, Interpretation of certain NMR Spectra. Electron spin Resonance (ESR), principle of ESR, ESR spectrometer, Total Hamiltonian, Hyperfine structure, ESR spectra of free radican in solution.

Nuclear Quadrupole Resonance Spectroscopy (NQR): Principle of NQR,NOR instrumentation. Mossbauer Spectroscopy : Recoilless Emission and absorption,Experimental Techniques, Isomer shift, Quadrupole Interaction, Magnets,Hyperfine Interaction, Applications.

1. Modern optics – Grant R. Fowles, Holt Rinehart and Winston Inc, NY.
2. 2. Fundamentals of Molecular Spectroscopy - C.N. Banwell, IV edition, Tata McGrawHill, 1999.
3. 3. Molecular structure and Spectroscopy - G. Aruldhas, I edition, Printice Hall of India, 2001.

SECOND YEAR PAPER –I

Quantum Theory

unit- I

The Physical basis of Quantum Mechanics: Experimental Background - The Old Quantum theory Uncertainty and Complemenarily Discussion of Measurement wave packets in Space and Time.

The Schrodinger Wave equation: Development of the Wave Equation Interpretation of the Wave Equation - Energy Eigen functions - One dimensional Square well potential.

Eigen functions and Eigen Values: Interpretative Postulates and Energy Eigen functions - Momentum Eigen functions - Motion of a free Wave Packet in One Dimension.

UNIT - II

Discrete Eigen values: Bound states - Linear harmonic Oscillator Spherically symmetric potentials in Three dimensions - Three dimensional square well potential the Hydrogen atom

Scattering theory: The scattering cross section - General considerations - The Born Approximations, Partial wave

analysis - Exactly solvable Problems Mutual Scattering of Two particles.

UNIT - III

Matrix formulation of Quantum Mechanics: Matrix Algebra Transformation theory- Equations of Motions - Matrix Theory of Harmonic Oscillator. Symmetry in Quantum Mechanics: Space and Time Displacements - Rotation, Angular momentum - Combination of Angular States. Identical particles and Spin Identical particles - Symmetric and Antisymmetric wave function -Spin angular momentum - Density Operator and Density Matrix.

Approximation methods for bound states: Stationary Perturbation Theory - The Variation method Alternative Treatment of the perturbation Series - The WKB Approximation- Methods for Time department problems.

Semi Classical treatment of radiation: Absorption and Induced Emission - Spontaneous Emission Some Applications of radiation Theory.

UNIT - V

Relativistic Wave equations: Schrodinger Relativistic Equation, Dirac's Equation for a Central Field. Quantization of Wave field

UNIT - IV

quantization of classical field Schrodinger field -Electromagnetic field. Books for Reference :

1. Quantum Mechanics. L.l. Schiff, III edition, Me Graw Hill,

2. A Text Book of Quantum Mechanics, P.M. Mathews & K Venkatesan, TMH.

3. Quantum Mechanics, S.L Gupta, V.Kumar, H.V.Sharma and R.C. Sharma, Jai Prakash Nath, V edition.

4. Quantum Mechanics, J. Aruldhas, Printice Hall of India, I edition, 2002.

5. Quantum Mechanics, B.K. Agarwal and Haripraksh, Printice Hall of India, 1997.

6. Introduction to quantum Mechanics, L.Pauling and B.Wilson, McGraw Hill.

7. A text hook of Quantum Mechanics, S.L. Kakani and H.M. Chandala - Sultan Chand and Sons, 1996.
8. Quantum Mechanics, Louis Marchildon, Springer, 2002.

9. Quantum Physics, Stephen Gasiorowicz, John Wiley & Sons, 1996.

10. Quantum Mechanics, P.J.E. Peebles, Printice Hall, 1999.

11. Advanced Quantum Mechanics - Sathiya Prakash

SECOND YEAR PAPER –II

DIGITAL ELECTRONICS AND MICROPROCESSOR

UUnniitt--II

BINARY SYSTEMS : Digital computers and Digital systems - Binary numbers - Number base conversion - Octal and Hexadecimal numbers Complements - Binary codes - Binary Storage and Registers - Binary Logic - Integrated circuits. BOOLEAN ALGEBRA : Basic Definitions Axiomatic definition, Boolean Algebra - Boolean functions - Canonical and

Standard Forms - Other Logic operations - Digital Logic Gates - IC Digital Logic Families.

SIMPLIFICATION OF BOOLEAN FUNCTIONS : The Map Method - Two and Three Variable Maps - Four Variable Maps - Four Variable Maps Product of Sum simplification - NAND or NOR implementation - Other two level implementations - Don't Care conditions - The Tabulation Method - Determination of Prime impficants -Selection of Prime implicants concluding remarks. Unit-II

SEQUENTIAL LOGIC : Introduction Flip - Flops - Triggering of Flip-Flops

Analysis of clocked sequential circuits - State Redaction and Assignment Flip Flop Excitation Tables - Design Procedure - Design of Counters Design with state equations.

REGISTERS, COUNTERS AND MEMORY UNIT : Introduction Registers - Shift Registers - Ripple counters - Synchronous counters Timing Sequence - The Memory Unit - Examples of random Access Memories.

Unit-III

Microprocessor Architecture and its operations: Memory, Input / outout Instruction -classification Instruction

format - Instruction timings and operation status -overview of the 8085 Instruction Set.

Data Transfer (Copy) instruction Arithmetic Operations - Logic Operations - Writing assembly language programs - Debugging a program - Programming techniques - looping,counting and

indexing Additional Data Transfer and 16 bit Arithmetic Instructions - Arithmetic Operations related to Memory - Logic Operations -Rotate - Compare Counters and Time Delays Illustrative program - Hexadecimal number - Zero of Nine (Module Ten) Counter - Pulse Timing Flashing lights.

Unit-IV

Stack - Subroutine -Conditional Call and Return Instructions - Advanced Subroutine Concepts - BCD to binary conversion - Binery to BCD conversion - BCD to seven segment, LED code conversion - Binary to ASCII and ASCII to binary code conversion - BCD addition - BCD subtraction - Introduction to advanced instructions and Applications - Multiplication Subtraction with carry Microprocessor based development systems ad Assemblers - Writing programs using Assemblers.

Unit-V

Basic Interfacing concepts Interfacing output displays Interfacing Input Keyboards Memory - mapped Input / Output Interfacing Memory - Digital to Analog (D/A) Converters- Analog to Digital (A/D) converters - Basics in Programmable l/Os - Serial I/O Software controlled asynchronous I/ O - Hardware controller serial I/O using Programmable Chip - Designing a Microcomputer system - Data Transfer between Two Micro Computers in Distributed Processing. Architecture of 8086 -Instruction set - Programming (elementary).

Books for Reference:

1. Digital Electronics and Computer Design, M. Morris Mano, PHI Publishers.

2. Microprocessor Architecture Programming and Applications with 8085/8080A, R S Gaonkar, Wiley Eastern Limited, 1993.

3. Digital Computer Fundamentals, (VI Ed.) Thomos C. Bartee, Mc Graw Hill.

4. Introduction to Microprocessors : Software, Hardward Programming, A.Leventhat, PHI Publishers.

5. Introduction to Microprocessors, (lll Ed.) A.P. Mathur, TMH.

6. Digital Electronics - A practical approach, William Kleitz, Printice Hall India, 1996.

7. Microprocessors and Interfacing Programming and Hardware, Douglas V.Hall, TMH,1994.

SECOND YEAR PAPER –III

ATOMIC AND NUCLEAR PHYSICS

UNIT – I

The Helium atom - The Exclusion principle – Electronic structure of atoms– L.S. Coupling – terms of equivalent electron – Atoms with one or two valence electrons – Spectra of alkaline earths. X-ray spectra – Bragg's law – Laue equations – Reciprocal lattice – Bragg diffraction condition in terms of reciprocal lattice – Brilliouin Zone – Atomic

scattering factor – Geometrical structure factor – X-ray diffraction – Laue method – Rotating crystal method – Powder method.

Molecules: The Hydrogen molecule ion – Molecular orbitals of diatomic molecules – Electronic configuration of some diatomic molecules – Poly atomic molecules – conjugated molecules.

UNIT – II

Nuclear Structure: Classification of nuclei – isotopes; isobar – properties of nuclei – Nuclear binding energy – Nuclear radius – methods of determination – nuclear spin –

Nuclear magnetic moment – Nuclear quadrupole moment – parity –Nuclear forces – The Ground state of Neutron – Neutron – Proton scattering at low energies – Non-central forces – Experimental evidence – properties – magnetic moment of neuteron – Exchange forces – Meson theory of nuclear forces. Nuclear models.

Liquid Drop model Shell model Nuclear spin and magnetic moment -Electric quadrupole moment - Collective model.

Nuclear processes: Radioactive decay – Theory of alpha decay – Geiger – UNIT – III

Nuttal law – alpha raw scattering – long and short range alpha particles, Beta decay – neutrino hypothesis – Theory of Beta decay – selection rules – Nonconservation of parity in beta decay – Wu's experiment – Electron capture – Measurement of gamma ray energies – Multipole radiations – internal conversion – Angular correlation in gamma emission – Mossbaur effect.

UNIT – IV

Nuclear Reactions: Kinds of Nuclear reactions – Conservation laws – QValue – Nuclear Cross Section –

Partial wave analysis of reaction cross section – compound nucleus – Reciprocity theorem – Continuum theory of nuclear reaction– Breit – Wigner disperson formula.

Neutron Physics: Production and Classification of Neutrons – Properties – Neutron detection – Slowing down of neutrons – Moderators – Neutron diffusion – Fermi age equation – neutron velocity selector.

Nuclear fission and fusion: Nuclear fission – Bohr – Wheeler theory – Nuclear chain reactions – four factor formula – nuclear reactor – critical size – general aspect of reactor

design – Breeder reactor – Thermonuclear reactor – thermo nuclear reactions – Plasma confinement.

UNIT – V

Elementary Particles and detectors: Classification of fundamental particles– Lepton – Meson – Hadrons Strangenes'– types of interactions – study of allowed and forbidden reactions with conservations laws CPT – theorem.

Particles and Antiparticles: Production and detection of antiprotons – antinentron. Elementary Particle Symmetries SU(2) and SU(3) – Gell-mann –

Okubo mass relation - Quark theory – Quark structure of mesons and baryons.

Books for Reference

1. Fundamental University Physics, Vol.Ill Alanso and Finn.
2. 2. Introduction to Atomic Spectra, H.E. White, Mc Graw – Hill.
3. 3. Nuclear physics – An Introduction – S.B. Patel, Wiley Eastern.
4. 4. Nuclear Physics, D.C. Tayal, Himalaya Publishing House.
5. 5. Nuclear Physics, R.R.Roy Ans B.P Nigam, Wiley Eastern.
6. 6. Fundamentals of Nuclear Physics, Herald Enge.

SECOND YEAR PAPER –IV

CONDENSED MATTER PHYSICS

UNIT-1

Periodic arrays of atoms. Fundamentals types of Lattice, Index system for crystal planes and Simple crystal structures.

Bragg Law - Experimental diffraction methods - Derivation of scattered wave amplitude, Brillouin zones, Fourier Analysis of the basis, Debye Waller factors.

Inert gas (Vander Waals) Crystals, Ionic Crystals - Covalent crystals, metal crystals, hydrogen bonded crystals and atomic radii.

Vibrations of mono atomic and diatomic lattices, quantization of lattice vibrations - phonon momentum inelastic scattering of neutrons by phonons. Einstein and Debye's theories of lattice heat capacity, thermal expansion thermal conductivity - umklapp process. UNIT- II

Free electron theory of metals - heat capacity and electrical resistivity of metals. Hall effect and Quahtum Hall effect, Wiedemann - Franz law.

Nearly free electron model - Bloch functions - Kronig - Penny model -Energy band structure - Tight binding approximation, Wigner - Seitz me thod - Cohesive energy - Reduced periodic and extended zone schemes - construction of Fermi surfaces. Fermi surface of copper - Electron orbits, hole orbits and open orbits.

Direct and indirect band gap semiconductors - Equations of motion concept of effective mass and its significance - Intrinsic carrier concentration - Impurity Conductivity - semimetals.

Books for Reference

1. C. Kittel, Introduction to Solid State Physics , 7th edition, Wiley- Eastern.

2. A J Decker, Macmillan Solid State Physics.

3. S.O.Pillai, Solid State Physics, Wiley Eastern and New Age International, 1994.

4. Saxena, Gupta and Saxena, Prgathi Prakashan,Fundamentals of Solid State Physics.

5. HC Gupta, Vikas Publishers,Solid Slate Physics, 1995.

6. G. Grosso and G. Pastori Parravicni, Solid State Physics, Academic Press, 2000.

FIRST YEAR PRACTICALPAPER –I

GENERAL EXPERIMENTS (Any Ten)

1. Error analysis of experimental data 2. Least square and curve fitting.

3. Numerical integration techniques.

4. Two dimensional potential mapping – Electrolytic tank model (for parallel and cylindrical plates)

5. Magneto optic effect (Faraday rotation) – Verdet's constant measurements.

6. Elastic constants – interference method – (Elliptical and hyperbolic fringes).

7. Photo-resister –Optical absorption and polarized light intensity measurements.

8. Spectrum calibration – Hg and Cu lines.

9. Michelson Interferometer – Wavelength measurement.

10. Refractive index measurements using laser beam.

11. Mutual Inductance by Carry Foster's Bridge.

12. Owen's Bridge – L. M. and K.

13. Anderson's Bridge -L.M. and K.

14. Cauchy's Constant.

15. Fabry – Perot etalon – Wavelength determination.

FIRST YEAR PRACTICALPAPER –II

Electronics Experiments. (Any Ten)

1. IC based regulated power supply – voltage control and current control.

2. Filter circuits – Low pass and high pass – RC Filters (sine and square wave inputs)

3. Single / two stage transistor (CE model) amplifier – Biasing – Frequency response of gain and phase – I/P – O/P, impedances.

4. Op.amp. Analog circuits –Iinventing, non – inverting differential (dc and ac version) voltage follower

5. Op.amp. Analog circuits –I – Summing, differentiator and integrator.

6. Op.amp. analog circuits –I – Logarithmic and exponential amplifier, multiplication and division.

7. Wien bridge – oscillator based on Op.amp.

8. Karnaugh map – Simplification of Boolean expressions.

9. Logic circuits – Verification of Boolean expression.

10. Multivibrator (Op.amp based) – astable , mono and bistable.

11. Multivibrator (555 based) – astable, mono and bistable.

12. Schmitt trigger and electrical hysteresis – Op.amp or 555.

13. FET and SCR Characteristics and amplifiers.

SECOND YEAR PRACTICALPAPER –I

GENERAL EXPERIMENTS (Any ten)

1. X-ray powder pattern - Accurate cell constant determination (Film will be given).

2. Debye Waller factor evaluation.

3. Laue Pattern - Indexing Method.

4. Alo Band Spectrum analysis.

5. Identification of Elements by spectroscopic method.

6. Second moment calculation of NMR spectrum.

7. Hall effect.

8. G.M. counter.

9. Magnetic susceptibility measurement - Guoy balance, Quinckies method

10. B-H curve

11. Resolving power of a prism

12. Edsor and Butler Fringes Calibration of spectrometer

13. Laser - Diffraction Experiments

14. Polarisation by reflection (Brewster angle) determination

15. Dielectric constant measurements

SECOND YEAR PRACTICALPAPER –II

ELECTRONICS EXPERIMENTS (Any ten)

1. Digital To Analog Converter

2. Two Level circuits Designing and Implementation

3. IC 555 Timer Square wave generator

4. Solving Simulataneous Equations Using IC 741

5. J.KFlipFlopUp and Down Counter

6. Shift and Ring Counters

7. Half Adder and Full Adder

8. Computer I Numerical Integration

9. Computer II Graphics Generation of Lissajous figure Using EXCEL

10. Computer III Solution to Differential Equations

11. Microprocessor I Assembly Language Program

12. Microprocessor - II I/O Operations - Generatation of Square wave

13. Analog Computers Using Discrete Components

14. Phase Shift Oscillator