II Semester

REVISED SYLLABUS

Department Name: Physics
Semester - II

Course Title: Electromagnetics	**Course Code:** HCT2.1
Total Contact Hours: 60 Hours	**No. of Credits:** 04
Internal Assessment Marks: 20	**Duration of SEE :**03 Hours
SEE Marks: 80	

Course Outcomes (COs):
At the end of the course, students will be able to:

1. Illustrate the physical concepts of static electric and magnetic fields.
2. Illustrate the physical concepts of varying electric and magnetic fields.
3. Apply potential and field concepts to electromagnetic systems.
4. Analyze the propagation of wave in different media.
5. Identify and apply appropriate theoretical concepts to solve problems in electromagnetism.

Unit -1	**15 hours**

Electrostatics:
Introduction, Divergence and curl of electrostatic field, Gauss law in integral and differential forms with applications, Poisson's and Laplace's equations, Boundary conditions and Uniqueness theorems, electrostatic potential and The Potential of a Localized Charge Distribution. Multipole expansion of the potential, the Energy of a Point Charge Distribution, monopole and dipole terms, electric field of a dipole, dipole-dipole interaction. Electrostatic fields in matter, polarization, macroscopic field equations, electrostatic energy in dielectric media. The physical problems in electrostatics.

Unit -2	**15 hours**

Magnetostatics:
Introduction, Current density, continuity equation, magnetic field of a steady current, the divergence and curl of B, Ampere's law, magnetic vector potential, multipole expansion of vector potential of a localized current distribution, torques and forces on magnetic dipoles, effect of a magnetic field on atomic orbits. Magnetic fields in matter, macroscopic equations, magnetostatic boundary conditions, magnetic scalar potential, Energy in the magnetic field. The physical problems in magnetostatics.

Unit -3	**15 hours**

Time-changing Electric and Magnetic Fields:
Introduction, Faraday's Law, Maxwell's equations – Maxwell's Equation from Ampere's Law, Maxwell's equations in matter. Stokes' Theorem, Alternating-current Behavior of Ferromagnetic Materials, Eddy Currents, Displacement Current, Dielectric Hysteresis, Boundary conditions, General Field Relations, Comparison of Electric and Magnetic Field Relations, Problems.
Potential and Fields:
Vector and scalar potentials, Guage transformations – Lorentz gauge and Coulomb guage, Retarded Potentials, Lienard-Wiechert potentials, fields of a moving point charge.

Unit -4	**15 hours**

Electromagnetic Waves and Wave Guides:
Electromagnetic Waves: Propagation of waves in linear media, reflection and transmission at normal and oblique incidence, Electromagnetic waves in non-conducting and conducting medium, skin depth, reflection at conducting surface.
Wave guides: Fields at the surface and within a conductor, modes in rectangular wave guide, TE waves in a rectangular wave guide, Co-axial transmission line and cylindrical cavities.

References:

1. Introduction to Electrodynamics, D J Griffths, PHI, Third Edition, 2012.
2. Electromagnetics, B.B. Laud, New Age International PVT. LTD (1987).
3. Classical Electrodynamics, J D Jackson, 4th Edition, John Wiley & Sons, 2005.
4. Electromagnetics, John D Kraus, Keith R Carver, Second Edition, McGraw-Hill Kogakusha Ltd., 1973.

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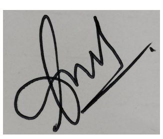

REVISED SYLLABUS

Department Name: Physics
Semester - II

Course Title: Elementary Quantum Mechanics	**Course Code:**HCT2.2
Total Contact Hours: 60 Hours	**No. of Credits:** 04
Internal Assessment Marks: 20	**Duration of SEE :**03 Hours
SEE Marks: 80	

Course Outcomes (COs):
At the end of the course students will be able to:
1. Distinguish between phenomena at classical and quantum level.
2. Apply basic formalism of quantum mechanics to simple physical systems.
3. Apply Schrodinger time independent wave equation to subatomic particles.
4. Apply quantum mechanical approximation methods to physical systems.

Unit 115 hours

Physical basis of quantum mechanics: Experimental background: inadequacy of classical Physics, Planck's quantum hypothesis, Bohr model of Hydrogen spectra, Correspondence principle, experimental observations of quantized orbits, inadequacy of quantum theory.

Schrodinger wave equation

Development of Schrodinger wave equation: One-dimensional and extension to three dimensions inclusive of forces. Interpretation of wave function: Statistical interpretation, normalization, expectation value and Ehrenfest's theorem. Energy eigen functions: separation of wave equation, boundary and continuity conditions.

Exactly solvable eigen value problems-I D

One dimensional: Square well and rectangular step potentials, Rectangular barrier, Harmonic oscillator

Unit 215 hours

Exactly solvable eigen value problems-III D

Three dimensional: Particle in a box. Particle in a spherically symmetric potential, rigid rotator, Hydrogen atom**General formalism**

Hilbert space, observables, quantum mechanical operators – definition and properties, eigen values and eigen vectors of an operator; Hermitian operator, unitary and projection operators. Commuting operators and complete set of commuting operators. Bra and ket notation for vectors. The fundamental postulates, General uncertainty relation, Dirac notations.

Unit 315 hours

Representation theory: Matrix representation of an operator, co-ordinate and momentum representations. Expectation values, matrix method solution of linear harmonic oscillator.

Approximation methods for stationary states: Time independent perturbation theory– Variation method, eigen values in the first approximation, perturbed harmonic oscillator. Application to an harmonic oscillator and to the ground state of Helium atom. WKB method: Application to barrier penetration, Bohr-Sommerfeld quantum condition.

Unit -4 15 hours

Theory of Scattering

Scattering cross-section, wave mechanical picture of scattering, scattering amplitude. Born approximation. Partial wave analysis: phase shifts, scattering amplitude in terms of phase shifts, optical theorem; exactly solvable problem-scattering by square well potential.

Prescribed books

1. Quantum Mechanics: G Aruldhas, 2nd Edition, [PHI LearingPvr Ltd, 2013]
2. Quantum Mechanics: Theory and Applications: A K Ghatak & S Loknathan [MacMillan India Ltd., 2010]

Reference Books:

3. Text book of Quantum Mechanics: P M Mathews and K Venkateshan [TMH, 1994]
4. Quantum Mechanics: V K Thankappan [Wiley Eastern, 1980]
5. Modern Quantum Mechanics: Sakuraj J J and Tuan S F [Addison Wesley 1999]
6. Quantum Mechanics by Satya Prakash and Swati Saluja, KNRN Publishers, 2016

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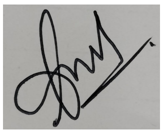

REVISED SYLLABUS

Department Name: Physics
Semester - II

Course Title: Elementary Condensed Matter Physics	**Course Code:** HCT2.3
Total Contact Hours: 60 Hours	**No. of Credits:** 04
Internal Assessment Marks: 20	**Duration of SEE :** 03 Hours
SEE Marks: 80	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. Explain the fundamental concepts of crystal structure.
2. Apply X-ray diffraction technique to analyse crystal structure of materials.
3. Explain bonding and imperfections in crystals.
4. Apply lattice vibrations theory to analyse specific heat of solids.
5. Apply band theory of solids to analyse properties of solids.
6. Explain fundamentals of semiconductors, superconductors and liquid crystals.

Unit -115 hours

Crystal Structure

Fundamentals of Crystal structure – Crystal lattice and Translation vectors, Unit Cell, Concept of Weigner-Seitz cell, Basis; Symmetry Operations, Point groups and Space groups, Types of Lattices – Two dimensional and three dimensional lattices; Lattice directions and planes, Interplanar spacing, Simple crystal structures – Close-packed structures and Loose-packed structures with examples, Crystal structure of diamond and NaCl.

Unit -215 hours

X-ray diffraction and Bonding in Solids

X-ray diffraction, Bragg's treatment- Bragg's law, The Von Laue Treatment – Laue's Equations, X-Ray diffraction methods – The Laue's method, Rotating Crystal method and Powder method; Atomic scattering factor, Geometrical scattering factor and Extinction rules for cubic crystals, Qualitative discussion on Neutron and Electron diffraction.

Interatomic forces and types of bonding- Ionic, Covalent, Metallic, Van der waal' and Hydrogen bonds; Binding Energy in ionic crystals – Evaluation of Madelung constant and determination of Range; Binding Energy of Crystals of inert gases.

Unit -315 hours

Imperfections in Crystals and Lattice vibrations

Point imperfections - Schottky and Frenkel defects and their equilibrium concentrations; Line imperfections - Dislocations and their types, Stress fields of dislocations; Planar imperfections - Grain boundary; Colourcenters – F Centers and other Centers in alkali halides. Vibrations of 1D monoatomic and diatomic lattices, Phonons, Momentum of Phonons, Inelastic scattering of photons by phonons, Specific heat – Classical theory, Einstein's theory and Debye's theory. (Ref.1 & 2)

Unit -415 hours

Free Electron Theory of Metals and Band theory of Solids

Qualitative discussion of Free – Electron Model of metals; Electrical conductivity, Electrical Resistivity versus Temperature, Heat Capacity of Conduction Electrons, Fermi Surface, Electrical Conductivity and Effects of Fermi Surface, Thermal conductivity in Metals Bloch theorem, Kronig-Penny Model, Brillouin zone and construction in square lattice, Energy versus wave-vector relationship – different representations/zone schemes, Number of wavefunctions in a band, Velocity and Effective mass of electron, Distinction between metals, insulators and semiconductors. (Ref.1)

Semiconductors and Superconductors

Types of semiconductors, Conductivity in intrinsic semiconductors, conductivity in extrinsic semiconductors, Hall Effect and its applicationsSuperconductors, Meissner effect, Supercurrents and penetration depth, Critical field and critical temperature, Type I and Type II superconductors, BCS theory (qualitative), Qualitative discussion on MAGLEV, Superconducting magnet, Josephson effects.

References:

1. Solid State Physics by R. K. Puri & V. K. Babbar, S. Chand Publications.
2. Elementary Solid State Physics by M. Ali Omar, Pearson Education.
3. Solid State Physics by S .O. Pillai, New Age International.
4. Introduction to Solid State Physics by C. Kittel, Wiley Eastern Ltd.
5. Elements of Solid State Physics by J.P Srivastava, PHI Learning Pvt. Ltd.

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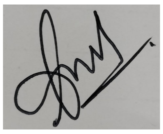

REVISED SYLLABUS

Department Name: Physics
Semester - II

Course Title: Elementary Nuclear Physics	**Course Code:** SCT2.1
Total Contact Hours: 60 Hours	**No. of Credits:** 04
Internal Assessment Marks: 20	**Duration of SEE :** 03 Hours
SEE Marks: 80	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. Explain the basic properties of nucleus and nuclear forces.
2. Explain fundamental nuclear reactions and nuclear models.
3. Describe nuclear decay types and fundamental interaction of radiation with matter.
4. Explain the principles and applications of nuclear radiation detectors.
5. Discuss the basics of nuclear energy, fundamental interactions and elementary particles.

Unit -115 hours

Basic Properties of Nucleus

Nuclear constitution. The notion of nuclear radius and its estimation from Rutherford's alpha scattering experiment, Coulomb potential inside the nucleus and the mirror nuclei. The nomenclature of nuclei and nucleon quantum numbers. Nuclear spin and Magnetic dipole moment. Nuclear electric moments and shape of the nucleus.

Nuclear Forces: General features of nuclear forces. Bound state of Deuteron with Square Well Potential, Binding Energy and size of Deuteron, electric and magnetic moments-evidence for non-central nature of nuclear forces. Yukawa's meson theory of nuclear forces.

Nuclear Reactions: Reaction scheme, types of reactions and conservation laws. Reaction kinematics, threshold energy and Q-value of nuclear reaction. Energetics of exoergic and endoergic reactions

Unit -215 hours

Nuclear Models

The Shell Model; Evidence for magic numbers, energy level, scheme for nuclei with infinite square well potential and the ground state spins. The Liquid Drop Model: Nuclear Binding Energy, Bethe-Weizsacker's Semi Empirical Mass Formula.

Nuclear Decays

Alpha decay: Quantum mechanical barrier penetration, Gamow's theory of alpha decay, range and energy of alpha particles and their relations, Half-life systematics. Beta decay: Continuous beta spectrum, Pauli's Neutrino Hypothesis and Fermi's theory of beta decay, Double beta decay, beta comparative half-life systematics.

Gamma decay: Qualitative consideration of multipole character of gamma radiation-Selection Rules; Systematics of mean lives for gamma multipole transitions, Gamma ray spectra and nuclear energy levels, Nuclear Isomerism, Internal Conversion (Qualitative).

Unit -315 hours

Interaction of Radiation with Matter

Interaction of Charged Particles with Matter, Ionization Energy Loss, Stopping Power and Range Energy Relations for Charged Particles, Cerenkov Radiation, Synchrotron Radiation, Interaction of Gamma Rays: Photoelectric Absorption, Compton Scattering and Pair Production Processes.**Nuclear Detectors** Introduction, Ionization Chamber, Semiconductor Detectors: Surface Barrier, Ge(Li) and HP-Ge; Proportional Counter, G M Counter, Scintillation Detector, Solid State Nuclear Track Detectors (SSNTD).

Unit -415 hours

Nuclear Energy and Elementary Particles

Fission Process, Fission Chain Reaction, Four Factor Formula and Controlled Fission Chain Reactions, Energetics of Fission Reactions, Fission Reactor.Fusion Process, Energetics of Fusion Reactions, Controlled Thermonuclear Reactions, Fusion Reactor, Stellar Nucleosynthesis.Fundamental interactions and their characteristic features. Elementary particles, Classification of Elementary particles, Conservation laws in elementary particle decays. Quark model of elementary particles.

References:

1. The Atomic Nucleus: R D Evans, Tata McGraw Hill Edition, 1955.
2. Physics of Nuclei and Particles: P Mermier and E Sheldon, Volume-I, Academic Press, Inc., 1970.
3. Physics of Nuclei and Particles: P Mermier and E Sheldon, Volume-II, Academic Press, Inc., 1969.
4. Nuclear Physics: D C Tayal, Himalaya Publishing House, Fifth Edition, 2015.
5. Introduction to Nuclear Physics: S B Patel, New Age International Pvt. Ltd Publishers, Second Edition, 2010.
6. Introductory Nuclear Physics: Kenneth S Krane, John Wiley & Sons, Inc., 1988.
7. Atomic and Nuclear Physics: S N Ghoshal, S. Chand & Company Pvt. Ltd., 2014.
8. Introduction to Nuclear and Particle Physics: V K Mittal, R C Sharma, S C Gupta, PHI Learning, 3rd Edition, 2013.
9. Nuclear and Particle Physics by Satya Prakash, S. Chand & Sons, 2005.

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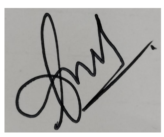

REVISED SYLLABUS

Department Name: Physics
Semester - II

Course Title: Electronics and Applications	**Course Code:**SCT2.2
Total Contact Hours: 60 Hours	**No. of Credits:** 04
Internal Assessment Marks: 20	**Duration of SEE :**03 Hours
SEE Marks: 80	

Course Outcomes (COs):
At the end of the course, students will be able to:

1. Students understand the principle and working of various Electrical and Electronicsinstruments and their applications.
2. Students are also able to design and develop various Electrical and Electronic Instruments viz. Ammeter, Voltmeter, Ohmmeter, Multimeter, Frequency meter, phase meter etc.
3. The students will understand the architecture, Instruction set, programming skills and Interfacing of different devices with microcontrollers.
4. The students will be able to design and fabricate microcontroller-based systems for various applications.
5. Students will understand the role of Microcontroller in Instrumentation.

Unit -115 hours

General Analog Measuring Instruments
Permanent-magnet moving coil (PMMC) Galvanometer: Torque and deflection, PMMC Mechanisms, DC Ammeters, DC Voltmeters, Ohmmeters: serial and shunt types, extension of range of meters, multi-meters. AC meters: Electrodynamometers, rectifier type, thermoinstruments.

Analog Measuring Instruments
Electronic voltmeters (Transistor, FET & Op-Amp Versions), AC Voltmeters: Rectifier type, RMS voltmeters, AC milli/micro voltmeters, Nano-ammeter, Analog frequency meter, Analog phase meter, Cathode Ray Oscilloscope: Single beam, dual trace, dual beam.

Unit -215 hours

Digital Measuring Instruments and Wave Form Generators
Digital voltmeters, Digital multimeter, Digital frequency meter, Digital phase meter, Q-meter, Digital storage oscilloscope and sampling oscilloscopes, Sine/Square wave generators, Radio frequency signal generator, Standard signal generator, function generator, Spectrum analyzer, Vector impedance meter.

Unit -315 hours

Microcontroller Architecture
Block diagram of 8051 microcontroller, Description of functional units of microcontroller, addressing modes, Classification of instructions set and programming, Comparative study of 8051 with 8031, 8751 and 89C51.

Unit -415 hours

Interfacing of Peripherals
Interfacing of memory (RAM & amp; EPROM), Programmable peripherals 8155, 8755 and their interfacing, Interfacing of A/D & D/A converters. Interfacing of seven segment display, Multiplexed display, LCD module, Stepper motor with 8051 microcontroller.

References:

1. Electronic Instrumentation and Measurement Techniques — William David Cooper & Albert D Helfriek.
2. Electronic Instrumentation - H S Kalsi
3. A Course In Electrical and Electronic Measurements and Instrumentation - K. Sawhney
4. The 8051 Microcontroller: Architecture, Programming and Applications –K. J. Ayala
5. The 8051 Microcontroller and Embedded Systems - Muhammad Ali Mazidi & J G Mazidi
6. Measurement of Systems—Application and Design — Earnest O Doeblin
7. MCS51 User Manual -Intel Corporation
8. Embedded Microcontrollers Data Book- Intel Corporation.

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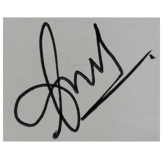

REVISED SYLLABUS

Department Name: Physics

Semester - II

Course Title: Physics in Everyday Life	**Course Code:**OET2.1
Total Contact Hours: 30 Hours	**No. of Credits:** 02
Internal Assessment Marks: 10	**Duration of SEE :**2 Hours
SEE Marks: 40	

Course Outcomes (COs):
At the end of the course, students will be able to:

1. Explain phenomenon in everyday life using laws of motion.
2. Explain phenomenon in everyday life using projectile motion, friction, periodic motion and law of forces.
3. Explain phenomenon in everyday life using concept of resistance.
4. Explain phenomenon in everyday life fluid flow and heat transfer.

Unit -115hours

The Laws of Motion:
Qualitative discussion of Newton's first law of motion, Inertia and types of inertia; Examples in everyday life: Falling backward when a bus moves quickly from rest, Moving forward when driver of a bus suddenly applies break, Getting down from a moving bus or train, Athlete taking a short run before a jump.
Qualitative discussion of Newton's second law of motion; Examples in everyday life: Pushing a car and a truck, Pushing a shopping cart, Hitting a ball, Rocket launch, Driving a car and car crash.
Projectile Motion, Friction, Periodic Motion and Law of Forces:
Qualitative discussion of projectile motion – maximum height, time of flight and range of the projectile; Examples in everyday life: Firing a Canon, Javelin throw, Hitting a Cricket Ball, Archery, Car and Bike Stunts, Disc throw.
Qualitative discussion of friction and its types; Examples in everyday life: Walking, Writing, Skating, Lighting a matchstick, Driving of a vehicle on the surface, Flight of aeroplanes, Drilling of a nail into the wall.

Unit -215hours

Resistance, Fluid flow and Heat transfer:
Qualitative discussion of Resistance, Heating effect of electric current; Examples in everyday life: Electric Stove, Iron Box, Electric heater, Electric bulb.
Qualitative discussion on Streamline and turbulent flow; Examples in everyday life: flow of water in a pipe, flow of water in a river, waterfalls, Qualitative explanation of Bernoulli's principle, Examples in everyday life: Sprayer, gas burner, Carburetor.
Qualitative discussion of heat transfer – conduction, convection & radiation; Examples in everyday life: Copper vessels, Packing of ice in saw dust, Wearing two shirts reduces cold, Bricks for cold storage, Wooden / ebonite handles of utensils, Heating of water in a vessel, Heat energy from the Sun.

References:

1. How Things Work – The Physics of Everyday Life by Louis A. Bloomfield, Wiley, 6th Edition, 2016.
2. NCERT 11th and 12th Standards Text Books.
3. https://examples.yourdictionary.com/examples-of-inertia.html
4. https://byjus.com/physics/newtons-second-law-of-motion-and-momentum/
5. https://openstax.org/books/university-physics-volume-1/pages/5-5-newtons-third-law
6. https://studiousguy.com/projectile-motion-examples/

https://byjus.com/questions/give-10-examples-of-friction-in-our-daily-life/

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REVISED SYLLABUS

Department Name: Physics
Semester - II

Course Title: Nanomaterials	**Course Code:** OET2.2
Total Contact Hours: 30 Hours	**No. of Credits:** 02
Internal Assessment Marks: 10	**Duration of SEE :**2 Hours
SEE Marks: 40	

Course Outcomes (COs):
At the end of the course, students will be able to:

1. To get brief introduction about the nanomaterials and nanotechnology. Also understand the size and shape dependent on the physical properties of materials at nanoscale.
2. Analyze the advantages of using nanotechnology for various electronic applications.
3. Gain knowledge about nanomedicine, targeted drug delivery, diagnosis and treatment. Understand bio-inspired, biomimicking and bio-compatible nano-materials.

Unit -115 hours

Introduction:
Introduction to nanoscience: Science of low-dimensional materials, quantum effects, 1D, 2D and 3D confinement, Surface to volume ratio, Density of states, Excitons, Zero-, One-, Two- and Three-dimensional structure, Size control of nanostructures and their properties: optical, electronic, magnetic properties; surface plasmon resonance, change of bandgap; Application: catalysis, electronic devices.

Unit -215hours

Synthesis and Characterisation of Nanomaterials:
Synthesis: Top Down and Bottom up approaches: Ball Milling and Laser ablation techniques, Sol-gel, hydrothermal and green synthesis methods.
Characterisation: XRD, SEM, TEM and DLS methods.
Nanotechnology for Nanomedicine
Drug deliveries, nanoparticles in drug deliverable applications. , targeting ligandsnanoparticle in cancer treatment, tissue regeneration, growth and repair, impact of drug discovery and development.

References:

1. Nanolithography and patterning techniques in microelectronics, David G. Bucknall, Wood head publishing 2005
2. Transport in Nanostructures, D.K. Ferry and S.M. Goodmick, Cambridge university press 1997.
3. Optical properties of solids, F. Wooten, Academic press 1972
4. Charles P. Poole, Jr., Frank J. Owens, “Introduction to nano technology”, Wiley, 2003.
5. Gunter Schmid, “Nanoparticles: From Theory to Applications”, WileyVCH Verlag GmbH & Co., 2004.

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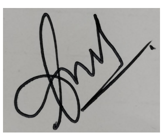


REVISED SYLLABUS

Department Name: Physics
Semester - II

Course Title: Electromagnetics Lab	**Course Code:**HCP2.1
Total Contact Hours: 60 Hours	**No. of Credits:** 04
Internal Assessment Marks: 20	**Duration of SEE :**04 Hours
SEE Marks: 80	

Course Outcomes (COs):
At the end of the course, students will be able to:
1. Design experiments related to electromagnetism.
2. Conduct experiments related to electromagnetism.
3. Analyze and interpret experimental data related to electromagnetism.

List of Experiments

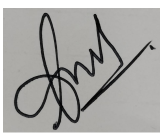
1. Magnetic field in a conductor (solenoid).
2. Dielectric constant measurement.
3. Magnetic filed in Helmholtz coil experiment.
4. Ferromagnetic Hysteresis.
5. Magnetic Induction.
6. Measuring velocity by electromagnetic induction.
7. Study of Eddy Current and Lenz’s law.
8. Study of Biot-Savart Law.
9. Study of Faraday’s laws of Induction.
10. Study of Ohms law.
11. Study of RC Circuits.
12. LCR Series and Parallel circuits.
13. Study of Kirchoff’s laws.
14. Magnetic field of coils.

Note:

1. Minimum of EIGHT experiments/computations must be carried out.
2. Experiments/Computations may be added as and when required with the approval of BoS.

References:

1. Physics Laboratory Manual, David H Loyd, Third Edition, Thomson Higher Education, USA.
2. PRACTICAL PHYSICS, J.A. GROWTHER, Sc.D., F.Inst.P, 1922.
3. Practical Physics In S.I., Edward Armitage, John Murray Publishers Ltd., 1972.
4. General Physics II Laboratory Manual, IZMIR Institute of Technology.October, 2020.



REVISED SYLLABUS

Department Name: Physics

Semester - II

Course Title: Condensed Matter Physics/Nuclear Physics Lab	**Course Code:** SCP 2.1
Total Contact Hours: 60 Hours	**No. of Credits:** 04
Internal Assessment Marks: 20	**Duration of SEE :** 04 Hours
SEE Marks: 80	

Course Outcomes (COs):
At the end of the course, students will be able to:
1. Design experiments to study properties of crystals.
2. Compute parameters of crystalline materials.
3. Design experiments to study electrical and thermal properties of solids.
4. Determine the physical parameters of nuclear radiations/radioactive sources.
5. Compute the half life of any radioactive materials by various methods.

List of Experiments

1. Determination of inter-planar spacing using X-ray powder pattern.
2. Measurement of resistivity of a semiconductor by four probe method (fixed temperature)
3. Energy gap of semiconductor by four probe method.
4. Acoustic waves in solids – Measurement of Ultrasonic velocity in solids.
5. Magneto-resistance of semiconductors.
6. Study of Hall Effect in semiconductors.
7. Energy gap of PN-junction diode/LED.
8. GM Counter characteristics: Determination of Operating voltage.
9. Determination of dead time of GM Counter – single source
10. Verification of inverse square law for nuclear radiation
11. Attenuation of β-rays in Aluminium.
12. Attenuation of γ-rays.
13. Nuclear counting statistics: Verification of Poisson Distribution.
14. Half life of K-40.

Note:

1. Minimum of EIGHT experiments must be carried out.
2. Experiments may be added as and when required with the approval of BoS.

References:

1. University Practical Physics by D.C. Tayal, Himalaya Publishing House, First Millenium Edition, 2000.
2. Advanced Practical Physics for students by B.L. Flint and H.T. Worsnop, Asia Publishing House, 1971.
3. A Text Book of Practical Physics, I. Prakash & Ramakrishna, Kitab Mahal, 11th Edition, 2011.
4. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, Heinemann Educational Publishers, 4th Edition, 1985.