GUJARAT UNIVERSITY
M. Sc. (Physics) Semester - I
(Effective from: 2020-2021)

Course	Name of the Course	Lect. Hrs. / Week	Internal Marks	External Marks	Total Marks	Course Credits
PHY-401	Quantum Mechanics-I and Mathematical Physics-I	4	30	70	100	4
PHY-402	Classical Mechanics-I and Statistical Mechanics	4	30	70	100	4
PHY-403	Electrodynamics-I and Programming in C-I	4	30	70	100	4
PHY-404	Solid State Physics and Plasma Physics	4	30	70	100	4
PHY-405PR	Practicals	6	30	70	100	4
PHY-406PT	Project	6	30	70	100	4
TOTAL		28	180	420	600	24

GUJARAT UNIVERSITY
M. Sc. (Physics) Semester - I
(Effective from: 2020-2021)

PHY 401: Quantum Mechanics-I & Mathematical Physics-I

The study of Quantum mechanics and mathematical physics help to understand almost all the modern branches of physics. Both are considered to be language of physics. The syllabus is tuned with the topics of SET / CSIR-NET model syllabus.

UNIT I: Approximation Methods for Stationary States & The variation method

Approximation Methods for Stationary States: Perturbation theory for discrete levels, Equations in various orders of perturbation theory, Non - degenerate case, Degenerate case - removal of degeneracy, Effect of an electric field on the energy levels of an atom (Stark-effect), Two – electron atoms. Illustrative examples

The variation method: Upper bound on ground state energy, Applications to excited states, Trial function linear in variational parameters, The Hydrogen molecule, Exchange interaction. Illustrative examples

UNIT- II: WKB Approximation & Evolution with time

WKB Approximation: One - dimensional Schrodinger equation, Bohr -Sommerfeld quantum condition, WKB solution of the radial wave equation.

Evolution with time: Exact formal solutions: Propagators, Schrodinger equation: general solution, Propagators, Alteration of Hamiltonian, transitions and sudden approximation. Illustrative examples

UNIT-III: Integral transform

Introduction, Laplace transforms, Solution of differential equations by Laplace transform, Convolution, Inverse Laplace transforms, Applications of Laplace Transform for different physical problems.

UNIT-IV: Group theory & Tensor

Group theory: Group, subgroups and classes, Invariant sub groups, factor groups, Homomorphism and Isomorphism, Group representation, Reducible and irreducible representation, Schur's Lemmas, orthogonality theorem, Character of a representation, Character tables, Decomposing a reducible representations into irreducible ones, Construction of representation, Representations of groups and quantum mechanics.

Tensor: Introduction, n - dimensional space, superscripts and subscripts, Coordinate transformations, Indicial summation conventions, Dummy and Real indices, Kronekar delta symbol, Scalars, Contravariant vectors and covariant vectors, Tensors of higher ranks, Algebraic operations, Symmetric and Antisymmetric tensors, Invariant tensors, Conjugate and reciprocal tensors, Relative and absolute tensors, Line element and matrix tensor, Fundamental tensors.

Reference books:

1. P.M. Mathews and K Venkatesan, A text book of Quantum Mechanic, Tata MC Graw - Hill publishing company Limited.
2. L. I. Schiff, Quantum mechanics, Tata McGraw - Hill publishing company Limited.
3. G. Aruldhas, Quantum mechanics, Prentice - Hall of India
4. A. Ghatak and S. Lokanathan, Quantum Mechanics: Theory and applications, Macmillan India Limited.
5. M.L. Boas, Mathematical methods in the physical sciences, JW, 1966
6. P.K. Chattopadhyaya, Mathematical Physics, Wiley Eastern Ltd.
7. G. Arfken, Mathematical methods for Physicists, Academic Press, 1970

GUJARAT UNIVERSITY
M. Sc. (Physics) Semester - I
(Effective from: 2020-2021)

PHY 402: Classical Mechanics-I & Statistical Mechanics

Classical mechanics: The study of classical mechanics gives insight to understand some fundamental laws of physics in the classical domain. This gives basic understanding to develop such laws of physics in quantum physics.
Statistical mechanics is a core course at the post graduate physics syllabus. The present syllabus is in continuation with undergraduate course and carries some of the advanced topics of the subject. The syllabus covers all the advanced topics of CSIR-NET model syllabus.

UNIT I: Canonical Transformation
Canonical transformation and Hamilton Jacobi theory: Gauge transformation, Canonical transformation, condition for transformations to be Canonical.
Poission bracket, canonical equations in terms of Poisson bracket notation, Relation between infinitesimal transformation and Poisson brackets, The Hamilton Jacobi equations, Separation of variables, Action angle variables, Properties of action angle.

UNIT II: Theory of small oscillations
General case of coupled oscillations, Eigen vectors and eigen frequencies, orthogonality of eigen vectors, normal coordinates, small oscillations of particles on string

UNIT III: Fluctuations
Brownian motion, Langevin theory of random motion, Time dependence of fluctuations, Power spectrum of fluctuation, Persistence and correlation of fluctuation, Wiener - Khinching theorem, Johnson noise - Nyquist theorem, Shot noise

UNIT-IV: Critical phenomena and phase transitions
Phase transitions, Condition for phase equilibrium, First order phase transition, Clusius – Clayperon equation, Second order phase transition, The Critical exponent, Co - operative processes, Curie - Weiss theory of Magnetic transition, Ising Model, Ising Model in zeroth approximation, Exact solution of one dimensional Ising Model, Order parameters

Reference books:

1. R.G. Takwale and P. S. Puranik, Introduction to Classical Mechanics, TMH, 1979
2. H. Goldstein, Classical Mechanics, Addision Wesley
3. A. B.Bhatia, Classical Mechanics, Narosa Pub. House, New Delhi
4. J.C. Upadhyay, Classical Mechanics
5. S.K. Sinha, Statistical Mechanics - Theory and Applications Narosa Pub House
6. E.S. Raja Gopal, Statistical Mechanics and Properties of Matter, McMillan Co. Limited.
7. Evelyn Guha, Statistical Mechanics - An Introduction, Narosa Publishing House
8. R.K. Patharia Statistical Mechanics, Pergamon Press
9. F. Reif, Funadamentals of Statistical Mechanics, McGraw Hill Companies
10. R.K. Srivastava & J. Ashokan, Statistical Mechanics, Printice Hall of India
11. John D. Walecka, Fundamentals of Statistical Mechanics, World Scientific
12. Landau and Lifshitz, Landau theory of phase transition in Statistical Physics

GUJARAT UNIVERSITY
M. Sc. (Physics) Semester - I
(Effective from: 2020-2021)

PHY 403: Electrodynamics-I & Programming in C-I

In the first unit the boundary effects on the propagation of electromagnetic waves will be examined. In the second unit the behavior of electromagnetic waves in the vicinity of the boundaries of the waveguides will be studied. The most efficient way of transmitting energy over short distances is by using wave guides. They have practical importance in electronic communication systems.

C-Programming Language: Provides basic understanding of control structures such as if, switch, while, for, continue and break, concepts of arrays and discusses the array handling techniques, The students will be exposed to number of programs using different logics based on above concepts.

UNIT I: Electromagnetic waves in Matter

Propagation in linear media, Reflection and transmission of plane waves at normal incidence, Reflection and transmission at oblique incidence, Total internal reflection, reflection from the surface of a metal, The frequency dependence of permittivity, Illustrative examples.

UNIT-II: Waveguides

Propagation of waves between conducting planes, Waves in guides of arbitrary cross- section, waveguide of rectangular cross section, co-axial waveguides, resonant cavities, dielectric waveguides, Illustrative examples.

UNIT- III: Programming in C

Keywords, Identifiers, Constants, Variables, Data Types, Operators, Expressions, Precedence and Associativity of operators, Type conversions, I/O operations, Branching: if, simple if, if-else, nesting of if-else, else if ladder, switch, conditional operator, Looping: while, do while, for, continue and break, goto.

UNIT- IV: Programming in C

Arrays: One dimensional arrays, declaration and initialization of arrays, two dimensional and multi-dimensional arrays, Character strings: Declaration and initialization of string variables, reading and writing of strings, arithmetic operations on characters, concatenation, comparing, copying and finding length of strings, string handling functions, table of strings

Reference books:

1. J. Griffiths, Introduction to electrodynamics, Prentice Hall India Ltd. (2nd ed.)
2. B.B. Laud, Electromagnetics, Wiley Eastern, (2nd ed.)
3. E. C. Jordan and K. G. Balmain, Electromagnetic waves and radiating systems, Prentice Hall of India, New Delhi, 1976
3. E. Balagurusamy, Programminng in ANSI-C (IInd.Ed.), TMH Pub.
4. P.Day and M.Ghosh, Programming in C, Oxford University press, 2007
5. B.S. Gottfried, Programming with C
6. Y. Kenetker, Let us C, BPB Pub.
7. B W Kernighan and D.K. Ritchie, C programming language, PH pub.

GUJARAT UNIVERSITY
M. Sc. (Physics) Semester - I
(Effective from: 2020-2021)

PHY 404: Solid State Physics, Electrodynemics and Plasma Physics

Most of the solid matter is crystalline i.e. nature favours the crystalline state of solids. Thus study of the solid state physics helps to understand many phenomena of physics, like crystal bonding, lattice vibration defects and superconductivity.
The study of plasma physics helps to understand the instability and the fission problem.

UNIT-I: Energy Bands
Introduction, Nearly Free Electron Model, Origin of energy gap, Magnitude of the energy gap. Bloch Functions, Kronig-Penney Model, Wave Equation of Electron in a Periodic Potential, Restatement of the Bloch theorem, crystal momentum of an electron, solution of the central equation, empty lattice approximation, Approximate solution Near Zone Boundary, Number of orbitals in a band, Metals and Insulators.

UNIT-II: Fermi Surfaces and Metals
Introduction, Reduced zone scheme, Periodic zone scheme, construction of Fermi surfaces, electron orbits, hole orbits and open orbits, Calculations of energy bands, Tight binding method for energy bands, Wigner -Seitz method, cohesive energy, Pseudopotential method, Experimental methods in Fermi Surface studies, Quantization of orbits in a magnetic field, de - Haas - Van Alphen Effect, Extremal orbits, Magnetic breakdown.

UNIT - III: Scattering and Dispersion
Scattering of radiation by a free charge, Scattering of radiation by a bound charge, Radiation damping, Dispersion in dilute gases, Dispersion in liquids and solids. Frequency dependence ε, μ, σ. Dispersion in non conductors, Free electrons in conductors and Plasma, Illustrative Examples.

UNIT - IV: Plasma Physics
The moment equations, Derivation of the moment equations, Magnetohydrodynamic OR MHD, One fluid model, Two fluid model, Illustrative Examples.
Collisions, Liouville equation, The system of B.B.G.K.Y. Equations, The B-V equation with self consistent field, Illustrative Examples.
Controlled thermonuclear reaction, Lawson criterion, The Coulomb barrier, Heating and confinement of the plasma, Radiation loss of energy, Instability problem, Magnetohydrodynamic conversion of energy, Plasma propulsion, Other plasma devices, Illustrative Examples.

Reference books:

1. C. Kittle, Introduction to Solid State Physics, 7th Ed., Wiley Eastern Limited, New Delhi
2. J.P.Srivastava: Elements of solid state physics, PHI, India.
3. J. Griffiths, Introduction to Electrodynamics (2nd & 3rd Edition) Prentice Hall India Ltd.
4. B. B. Laud, Electromagnetics (2nd Edition), Wiley Eastern,
5. S. N. Goswami, Elements of Plasma Physics, New Central book Agency Pvt. Ltd, Calcutta
6. F.F. Chen, Introduction to Plasma Physics, Plenum Press

GUJARAT UNIVERSITY
M. Sc. (Physics) Semester - I
(Effective from: 2020 - 2021)

PHY 405PR : PRACTICALS

1. Ultrasonic Interferometer
2. Phonon dispersion relation using Lattice dynamics kit
3. Efficiency of a G.M. Counter
4. Performance of a vacuum pump and verification of Gaede's equation
5. OPAMP parameters
6. OPAMP as an inverting / non-inverting amplifier
7. Universal gates (NAND and NOR)
8. RC Phase shift oscillator
9. Astable multivibrator
10. Diagonalization of Symmetric matrix (3x3).
11. Regulated Power Supply
12. C- programming
13. Characteristics of Optoelectronic devices
14. Study of Electron Spin Resonance

15% of new experiments can be introduced AND / OR replaced as per the need, with the permission of the Chairman of Board of studies.

PHY 406PT : POJECT

- In-house project work of 4-credit to be performed by each student.
- Alternatively, MOOC, Swayam or any other UGC recognized online course in Physics of at least 03 weeks duration will also be considered for 4-credit in this course.

GUJARAT UNIVERSITY
M. Sc. (Physics) Semester - II
(Effective from: 2020-2021)

Course	Name of the Course	Lect. Hrs. / Week	Internal Marks	External Marks	Total Marks	Course Credits
PHY-407	Quantum Mechanics-II and Mathematical Physics-II	4	30	70	100	4
PHY-408	Classical Mechanics-II and Solid State Properties	4	30	70	100	4
PHY-409	Semiconductor Physics and Devices	4	30	70	100	4
PHY-410	Analog Electronics	4	30	70	100	4
PHY-411PR	Practicals	6	30	70	100	4
PHY-412PT	Project	6	30	70	100	4
TOTAL		28	180	420	600	24

GUJARAT UNIVERSITY
M. Sc. (Physics) Semester - II
(Effective from: 2020-2021)

PHY - 407 : Quantum Mechanics - II and Mathematical Physics - II

The study of Quantum mechanics and mathematical physics help to understand almost all the modern branches of physics. Both are considered to be the language of physics.

UNIT - I: Quantum dynamics, Atoms and Molecules

The equations of motion, The Schödinger picture, The Heisenberg picture, Indistinguishable particles, Pauli principle, Inclusion of spin, Spin functions for two electrons, Spin functions for three electrons, The Helium Atom, Central field approximation, Thomas - Fermi Model of the atom, Hartree equation, Hartree Fock equations.

UNIT - II: Quantum theory of E-M waves and Radiation

Time dependent perturbation theory, Electric dipole interaction, Quantum electrodynamics, Creation and annihilation operators, Fock states, Quantization of field, Zero point energy, Cohrent state, Description of the electromagnetic field, Interaction of radiation with matter.

UNIT - III: Complex Variable

Introduction, Analytical Function, Theorems, Illustrative examples, Contour Integral Theorem, Integral Formula Theorem, Illustrative examples, Laurent Series Theorem, Method of finding residues. The Residue Theorem, Evaluation of Definite, Integrals by use of the residue theorem, Examples, Argument principle Example, Additional illustrative examples, The point at infinity, residue at infinity, Mapping Examples, Conformal mapping, Some Application of conformal Mapping examples, Additional illustrative examples.

UNIT-IV: Integral equations and Green's functions

Introduction, Conversion of differential equation into an integral equation, Linear Harmonic oscillator, Liouville - Neumann series, Separation methods, Examples

Nonhomogeneous boundary value problems and Green's functions, Green's functions for one-dimensional problems, Eigen function expansion of Green's function, Fourier transform method of constructing the Green's function, Green's functions in higher dimensions

Reference books:

1. Quantum Mechanics, V. K. Thankappen, Wiely eastern limited.
2. Quantum Mechanics, G. Aruldhas Prentice - Hall of India Private Limited.
3. Lasers and non - linear optics, B. B. Laud, New Age International Ltd.
4. Mathematical methods in the physical sciences, M.L Boas., JohnWilley, 1966
5. Mathematical Physics, P. K. Chattopadhyaya, Wiley Eastern Ltd.
6. Quantum Mechanics, L. I. Schiff, McGraw - Hill
7. Quantum Mechanics : Theory and applications A. Ghatak and S. Lokanathan, Macmillan India Limited.
8. Mathematical methods for Physicists, G. Arfken, Academic Press, 1970
9. Mathematical Physics, S. Satyaprakash, Sultan Chand & Sons, 1990

GUJARAT UNIVERSITY
M. Sc. (Physics) Semester - II
(Effective from: 2020-2021)
PHY 408 : Classical Mechanics II and Solid State Properties

Most of the solid matter is crystalline i.e. nature favours the crystalline state of solids. Thus study of the solid state physics helps to understand many phenomena of physics, like crystal bonding, lattice vibration defects and superconductivity.

UNIT - I: Non Linear Oscillations and Chaos

Introduction, Singular Points of Trajectories, Nonlinear Oscillations, , Limit cycle, Chaos, Logistic Map, Poincare System, Strange attractors

UNIT - II: Relativistic electrodynamics and classical field theory

Relativistic Mechanics, Proper time and proper velocity, Relativistic energy and momentum, Relativistic kinematics, Relativistic dynamics, Relativistic electro dynamics, How field transform. The field tensor, Electro dynamics in tensor notation, Relativistic potentials.

The transition from a discrete to a continuous system., The Lagrangian formulation for continuous system, Sound vibrations in gases as an example of Lagrangian formulation, The Hamiltonian formulation for continuous system, Description of fields by variational principles.

UNIT - III: Magnetism

Diamagnetism, Paramagnetism, Electron Spin Resonance, Nuclear Magnetic Resonance, Spin Relaxation, Weiss theory of Ferro magnetism, the exchange interaction, The Heisenberg model, Ferromagnetic domains, The Bloch wall, Origin of domains, Neel model of Antiferromagnetism, Neel model of Ferrimagnetism, Spin waves, Magnons in Ferromagnets, The Bloch $T^{3/2}$ law, Magnons in Antiferromagnets.

UNIT - IV: Superconductivity

Introduction, Meissner effect, Heat Capacity, Energy gap, Isotop effect, Thermodynamics of the superconducting transition, London equation, Coherence Length, BCS theory of superconductivity, BCS ground state, Flux quantization in a superconducting ring, Type - I and Type -II superconductors, Vortex state, Single particle tunneling, Josephson superconductor tunnelin, DC Josephson effect, AC Josephson effect, Macroscopic quantum interference, Introduction to High Tc Superconductors

Reference books:

1. Classical Mechanics, A. B. Bhatia, Narosa Publishing house.
2. Classical Mechanics (2nd Ed), Herbert Goldstein, Addison - Wesley Publishing Co.
3. Classical Mechanics, G. Aruldhas PHI Pvt. Ltd.
4. Classical Mechanics, J. C. Upadhyaya Himalaya Publishing House.
5. Classical Mechanics, S. N. Biswas Books and allied (P.) Ltd.
6. Classical Mechanics (3rd ed.), Goldstern, Poole and Safko, Pearson Education.
7. C. Kittle, Introduction to Solid State Physics, 7th Ed., Wiley Eastern Limited, New Delhi
8. J.P.Srivastava: Elements of solid state physics, PHI, India.

GUJARAT UNIVERSITY
M. Sc. (Physics) Semester - II
(Effective from: 2020-2021)

PHY - 409 : Semiconductor Physics and Devices

This paper is introduced as a core course in majority of universities. Proposed syllabus includes several fundamental and advanced topics of semiconductor physics. The syllabus is complementary to solid state physics and condensed matter physics. In devices, the construction and working principle of JFETs and MOSFETs and to use them as circuit elements is to be studied. Overall view of different digital IC logic families with emphases to TTL and CMOS ICs is also introduced.

UNIT I: Energy Bands and carrier concentration in Thermal Equilibrium

Energy Bands; Energy levels of isolated atoms, Energy momentum Diagram, Direct and Indirect band gap semiconductors; band diagrams of metals, semiconductors and insulators, Intrinsic carrier concentration, Concept of Fermi factor, Extrinsic semiconductors : Donors and Acceptors, Nondegenerate and Degenerate semiconductors, Carrier Drift : Mobility and its relation with resistivity and conductivity, The Hall effect.

UNIT II: p-n Junction

Band Diagram of p-n junction in thermal equilibrium; Equilibrium Fermi levels; Space Charge; Depletion region, Abrupt junction; Widths of the depletion region in abrupt junction; Depletion capacitance; Capacitance-voltage characteristics; Current voltage characteristics; Ideal diode equation.

UNIT III: Field Effect transistors & Optoelectronic Devices

Field Effect transistors: JFET: Characteristic Parameters of FET, Effect of Temperature on FET Parameters, FET Amplifiers: Common Drain Amplifier, Common Gate Amplifier, MOSFET: Depletion MOSFET, Enhancement MOSFET, Differences between JFET and MOSFET, Handling precaution for MOSFET

Optoelectronic Devices:

Sources: LED: Introduction, Radiative transitions, Emission spectra, Methods of excitations, LED Structures; Materials for choice, Definition of efficiencies, Semiconductor Laser: Semiconductor laser structures & Materials, Advantages laser over Optical sources

Detectors: Introduction, Photoconductor, Photodiodes, p-i-n & p-n photodiodes, Avalanche photodiode, Phototransistor, Photo voltaic effect and solar cells

UNIT IV: Digital Integrated Circuits

Introduction, Level of Integration, Digital IC Families, TTL Logic Family: Introduction , NAND Gate with Totem-pole Output, Types of TTL, TTL parameters: floating inputs, worst-case input/output voltages, profile and windows, compactibility, sourcing and sinking, noise immunity, standard loading, loading rules. Three state TTL Devices.

MOS Logic Family: Introduction, MOS Inverters, NMOS - NAND & NOR Gates. CMOS Logic Family : NAND & NOR Gates, Power Dissipation, CMOS characteristics: Floating inputs, Compatibility, Sourcing & Sinking, TTL to CMOS and CMOS to TTL interface, Comparison of Various Logic Families

Reference books:

1. Semiconductor Devices : Physics and Technology (2nd Ed) by S.M. Sze, Wiely (India)
2. Physics of Semiconductor Devices (4th Ed), S. M. Sze and Kwok. K. Ng., John Wiely & Co.
3. Semiconductor Physics and Devices: Basic Principle (3rd Edition), Donald Neauman, Tata McGraw Hill.

4. Solid State Electronic Devices (6th Edition), Ben G. Streetman and S. Banerjee, PHI
5. Physics of Semiconductor Devices, Michael Shur, PHI Learning.
6. Electronic Devices and Circuits: An Introduction, Allen Motershead , PHI
7. Optoelectronic Devices and Circuits: A.K. Ganguly, (NAROSA)
8. Digital Principles and Applications, Albert Paul Malvino, Donald P.Leach & Goutam Saha, TMH, 7th Edition
9. Digital Circuits and Systems, C.B Agrawal, & M.K Garg., Umesh Publications

GUJARAT UNIVERSITY
M. Sc. (Physics) Semester - II
(Effective from: 2020-2021)

PHY - 410 : Analog Electronics

By studying the topics on power amplifiers students will know about the types of the large signal amplifiers their merits and demerits. They also learn to analyze the large signal amplifiers. To make students familiar with the types of multivibrators, their working and applications topic of multivibrators is introduced. Some basic characteristics and applications of operational amplifiers are studied by the students at undergraduate level. In continuation of this study some more applications and characteristics of the operational amplifiers are introduced here.

UNIT-I: Power Supply and Regulators

IC Regulators using 723, Positive, Negative, Low and High voltage regulators, current booster transistor, fold back current limiting circuit.

The Operational Amplifier & Applications : active filters, low pass, high pass, band pass, band reject, notch, first and second order filters, comparators, sample and hold circuits, Logarithmic & antilogarithmic amplifiers,

UNIT-II: Tuned & Wide Band Amplifiers

The pole-zero diagram, single tuned amplifier-root locus, inductively coupled circuits, tuned primary amplifiers, tuned secondary FET amplifier, the double tuned transformer, stagger tuned amplifiers, response to pulses, bandwidth requirement for pulse amplification, rise time in pulse amplifier, sag of the pulse, shunt peak video amplifier. Rise time at the shunt peaked amplifier.
PLL : Basic PLL operation, Lock range and capture range, PLL as AM and FM detector.

UNIT III: Power Amplifiers & Multivibrators

Power Amplifiers: Class - A large signal amplifiers, transformer coupled Class - A amplifier, second harmonic distortion, push - pull Class - A amplifier, Class - B Push - Pull amplifiers.
Multivibrators: Astable, Monostable, Bistable Multivibrators and Schmitt Trigger circuits using transistors. (With analysis)

UNIT-IV: Operational Amplifiers & Its Applications

Frequency compensation and slew rate, DC and AC amplifiers, Integrator and differentiator, Voltage to current and current to voltage converter, Bridge amplifier, electronic analog computation, sine, square, triangular and saw tooth wave generators, Schmitt trigger.

Reference books:

1. K.R. Botkar, Integrated circuits, Khanna Publishers
2. Electronic Devices and Circuit Theory, Robert Boylested and L. Nashelsky, PHI (3rd Ed.)
3. Electronic Fundamentals and Applications : Integrated and Discrete Systems, John D. Ryder, PHI, Fifth edition.
4. OPAMP & Linear Integrated Circuits, Ramakant Gaiekwad, PHI

GUJARAT UNIVERSITY

M. Sc. (Physics) Semester - II
(Effective from: 2020-2021)

PHY 411PR : Practicals

1. Hall mobility and Hall angle
2. Schmitt trigger
3. SCR Characteristic
4. Absorption coefficient of Beta particles of Aluminum
5. Numerical Solution of a Polynomial
6. Resistivity of a semiconductor by four probe method
7. OPAMP as current/voltage and voltage/current converter
8. OPAMP as Integrator and differentiator
9. Calculation of Empty Lattice Energy Bands
10. C-programming
11. Random walk problem
12. Characteristics of Optoelectronics devices
13. Curie Temperature of a given material
14. Wavelength of a LASER source
15. Characteristics of a MOSEFET
16. Study of bending loss of an optical Fiber

15% of new experiments can be introduced AND / OR replaced as per the need, with the permission of the Chairman of the Board of Studies.

PHY 412PT : POJECT

- In-house project work of 4-credit to be performed by each student.
- Alternatively, MOOC, Swayam or any other UGC recognized online course in Physics of at least 03 weeks duration will also be considered for 4-credit in this course.