Maratha Vidya Prasarak Samaj's

# Karmaveer Shantarambapu Kondaji Wavare Arts, Science and Commerce College, CIDCO, Nashik

Uttamnagar, Nashik- 422 008 (Maharashtra)

Affiliated to Savitribai Phule Pune University Id. No. PU/NS/ASC/047/1993

AISHE C-42086 NAAC Re-accredited 'A' Grade (III Cycle 2017-22, CGPA 3.20)

Best College Award of Savitribai Phule Pune University Pune in 2009-10 and 2021-22

Internal Quality Assurance Cell

**Programme Outcomes (PO's)**

**Programme Specific Outcomes (PSO's)**

**Course Outcomes (CO's)**

## Syllabus: 2013 Pattern

Programme Outcome (PO's), Programme Specific Outcome (PSO's), Course Outcome (CO's)

# Department: Physics

Syllabus: 2013 Pattern

| Sr. No. | Name of the Programme | Year of introduction of programme | Duration of introduction of Programme |
|---|---|---|---|
| **2** | M.Sc. Physics | 2016-17 | 2 Years |

Programme Specific Outcome M.Sc. Physics)

| Sr. No. | Programme Specific Outcome (M.Sc. Physics) |
|---|---|
| **PSO 1** | To understand the basic concepts of physics particularly concepts in classical mechanics, quantum mechanics, electrodynamics and electronics to appreciate how diverse phenomena observed in nature follow from a small set of fundamental laws. |
| **PSO 2** | To pursue research related to Physics and Materials characterization. |
| **PSO 3** | To carry out experiments in basic as well as certain advanced areas of physics. |
| **PSO 4** | To appear for competitive examinations like, SET, GATE, NET, JEST, etc. to do research in national/international institutes and universities. |
| **PSO 5** | To be able to teach at college as well as school level. |

Course outcomes M.Sc. Physics:

| Class | Subject code | Title | Cos:After successful completion of This course, student will be able to |
|---|---|---|---|
| **MSc Sem II** | PHYUT 601 | Electrodynamics | CO 1: understand the multipole expansions and time varying fields. |
| | | | CO 2: understand Energy, Force, Momentum Relations and Electromagnetic Wave Equations. |
| | | | CO 3: understand the Inhomogeneous wave equations, Lorentz's and Coulomb's gauges, Gauge transformations. |
| | | | CO 4: understand the Minkowski's space time diagram, Four vector potential, electromagnetic field tensor. |
| | | | CO 5:Undestand the Wave equations in terms of electromagnetic potentials, D'Alembertian operator, Hertz potential and its use in computation of radiation fields. |
| | | | CO 6:Understand the Experimental basis for special |

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| | | | theory of relativity (Michelson – Morley experiment),Lorentz transformations |
| | PHYUT602 | Solid State Physics | CO 1: understand the crystal structure and band theory of solids. |
| | | | CO 2: understand the classical theory of diamagnetism, langevin theory of paramagnetism. |
| | | | CO 3: understand the concepts regarding ferromagnetism and antiferromagnetism. |
| | | | CO 4: understand the superconductivity and dielectric properties of solids. |
| | | | CO 5: understand the Clausius– Mossotti relation, Piezoelectricity. |
| | | | CO 6:Understand the Type I and II superconductors, Thermodynamics of superconductivity |
| | PHYUT603 | Experimental Techniques in Physics | CO 1: understand the concepts regarding signal, signal analysis and sensors. |
| | | | CO 2: study the vacuum physics and its applications in different fields. |
| | | | CO 3: study the different vacuum techniques. |
| | | | CO 4: study the Vacuum gauges: McLeod, Thermocouple (Pirani), Penning gauges. Hot cathode ionization (triod type), Bayard-Alpart. |
| | | | CO 5:Study the Techniques of production of UV/Visible,microwave, IR radiations |
| | | | CO 6:Study the SEM,TEM,AFM,XRD,TGA |
| | PHYUT604 | Quantum Mechanics I | CO 1: understand the self adjoint operators, eigen |
| | | | CO 2: functions and eigen values, degeneracy, Dirac delta function, Completeness and closure property. |
| | | | CO 3: understand the Dirac's bra and ket notation, dynamical variables and linear operators, projection operators, unit operator, unitary operator, matrix representation of an operator |
| | | | CO 4: understand the computation of Clebsch-Gordon coefficients. |
| | | | CO 5: understand the time dependent and independent Perturbation theory, WKB approximation. |
| **MSc Sem III** | PHYUT701 | Statistical Mechanics in Physics | CO 1: understand the Probability theory, Statistical Description of thermodynamic syste |
| | | | CO 2: understand the classical statistical mechanics. |
| | | | CO 3: understand the applications of statistical mechanics and quantum distribution functions. |
| | | | CO 4: understand the boltzmann limit of boson and fermion gases. |
| | | | CO 5: understand the applications of Bose-Einstein statistics and Fermi-Dirac statistics. |

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| | | | CO 6:understand the Photon gas – i) Radiation pressure ii) Radiation density iii) Emissivity |
| | PHYUT 702 | Physics of Semiconductor Devices | CO 1: understand the Band structure of semiconductors. |
| | | | CO 2: understand the current Voltage characteristics. |
| | | | CO 3: understand the metal semiconductor IMPATT Diode. |
| | | | CO 4: understand the Depletion layer and surface recombination. |
| | | | CO 5: understand the Formation of transistor, Basic current Voltage relationship, current gain in transistor Injection efficiency. |
| | | | CO 6:understand theSchottky effect, Energy Band relation at metal semiconductor contact. |
| | PHYDT 703 | Physics of Thin Films | CO 1:understand the vacuum techniques, Comparison of thin and thick films |
| | | | CO 2:understand theTolansky technique, Talystep (styles) method, Quartz crystal microbalance |
| | | | CO 3:understand the Properties of thin films-Electrical Properties, Mechanical properties |
| | | | CO 4::understand the Nucleation, condensation, Capillarity model, Atomistic model, |
| | | | CO 5: study Applications of Thin Films: |
| | | | CO 6:understand the electro acoustics and telecommunication. |
| | PHYDP704 | Electronic Instrumentation-I | CO 1:: understand the General configuration and functional description of measuring instruments |
| | | | CO 2:study Electrical transducers, resistive, strain gauge, thermistor, inductive transducers, variable reluctance. |
| | | | CO 3::understand the Data acquisition and conversion |
| | | | CO 4:: understand the Printers: principle of Laser printers only |
| | | | CO 5:understand the microprocessor based instruments |
| **MSc Sem IV** | PHYUT 801 | Nuclear Physics | CO 1: understand general properties and concepts of nuclei. |
| | | | CO 2: understand the principle of radiation detectors and nuclear models. |
| | | | CO 3: understand reaction Dynamics, nuclear reactors and accelerators. |
| | | | CO 4: understand the principle of nuclear interactions and particle physics. |
| | | | CO 5: understand the elementary particles, Quarks and Higgs Boson concept. |
| | | | CO 6: understand the Particle Physics. |

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|---|---|---|---|
| | PHYUT 802 | Material Science | CO 1: understand the Properties of Materials and Defects in Solids |
| | | | CO 2: understand the Mechanism of Diffusion, Fick's first and second laws of diffusion, solution to Fick's second law |
| | | | CO 3: understand the Metallurgical Thermodynamics |
| | | | CO 4:understand the Thermodynamic properties of solutions (mixing processes – Rault's law, activity coefficien |
| | | | CO 5:understand the Type I (Cu-Ni) phase diagram, Type II (explanation only) phase diagram, Type III (Pb-Sn) phase diagram |
| | | | CO 6:understand the Experimental determination of phase diagrams |
| | PHYDT 803 | Physics of Nano materials | CO 1:: Understand the history of nanomaterialsand challenges in nanotechnology. |
| | | | CO 2:Understand the different methods of synthesis of nanomaterials and their importance. |
| | | | CO 3:Understand the different characterization techniques use to study nanomaterials. |
| | | | CO 4:Understand the Mechanical, Electrical, Thermal, Optical, solubility, melting point and Magnetic |
| | | | CO 5:: Properties of nanomaterials. |
| | | | CO 6:Understand the application of nanomaterials in Medical, Biological, Automobiles, Space, Defense, Sports, Cosmetics and Cloth industry. |
| | PHYDP 804 | Electronic Instrumentation-II | CO 1: : understand the Control systems, Process control block diagram, Control system Evaluation |
| | | | CO 2: Discrete Process Control |
| | | | CO 3:: understand the Process Characteristics Process Load, Transient, Process Lag |
| | | | CO 4:: understand the two position controls and multivariable alarms. |
| | | | CO 5: : understand the MATLAB an introduction and applications |

HoD, Physics

IQAC Coordinator

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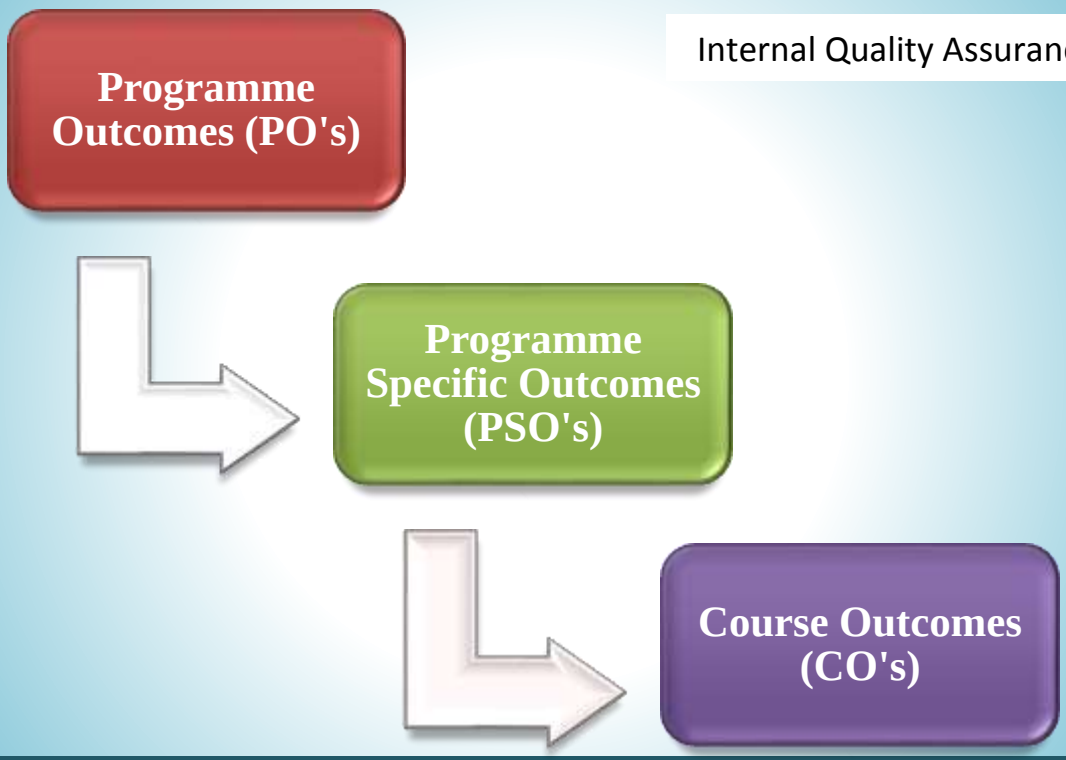


## Syllabus: 2019 Pattern

Programme Outcome (PO's), Programme Specific Outcome (PSO's), Course Outcome (CO's)

# Department: Physics

Syllabus: 2019 Pattern

| Sr. No. | Name of the Programme | Year of introduction of programme | Duration of introduction of Programme |
|---|---|---|---|
| **2** | M.Sc. Physics | 2016-17 | 2 Years |

Programme Specific Outcome (M.Sc. Physics)

| **Sr. No.** | **ProgrammeSpecific Outcome (M.Sc Physics)** |
|---|---|
| **PSO 1** | To understand the basic concepts of physics particularly concepts in classical mechanics, quantum mechanics, electrodynamics and electronics to appreciate how diverse phenomena observed in nature follow from a small set of fundamental laws. |
| **PSO 2** | To pursue research related to Physics and Materials characterization. |
| **PSO 3** | To carry out experiments in basic as well as certain advanced areas of physics. |
| **PSO 4** | To appear for competitive examinations like, SET, GATE, NET, JEST, etc. to do research in national/international institutes and universities. |
| **PSO 5** | To be aebl to teach at college as well as school level. |

| Class | Subject code | Title | Cos: After successful completion of this course, student will be able to |
|---|---|---|---|
| MSc Sem III | PHCT-231 | Statistical Mechanics | CO 1: understand the Probability theory, Statistical Description of thermodynamic system. |
| | | | CO 2: understand the classical statistical mechanics. |
| | | | CO 3: understand the applications of statistical mechanics and quantum distribution functions. |
| | | | CO 4: understand the boltzmann limit of boson andfermion gases. |
| | | | CO 5: understand the applications of Bose-Einstein statistics and Fermi-Dirac statistics. |
| | PHCT-232 | Solid State Physics | CO 1: understand the crystal structure and band theory of solids. |

| Class | Subject code | Title | Cos: After successful completion of this course, student will be able to |
|---|---|---|---|
| | | | CO 2: understand the classical theory of diamagnetism, langevin theory of paramagnetism. |
| | | | CO 3: understand the concepts regarding ferromagnetism and antiferromagnetism. |
| | | | CO 4: understand the superconductivity and dielectric properties of solids. |
| | | | CO 5: understand the superconductivity and dielectric properties of solids. |
| | PHCT-233 | Experimental Techniques in Physics - I I | CO 1: understand the concepts regarding signal, signal analysis and sensors. |
| | | | CO 2: study the vacuum physics and its applications in different fields. |
| | | | CO 3: study the different vacuum techniques. |
| | | | CO 4: study the Vacuum gauges: McLeod, Thermocouple (Pirani), Penning gauges. Hot cathode ionization (triodtype), Bayard-Alpart. |
| | PHOT-234 | Material Science - I | CO 1: understand the properties of materials and defects in solids. |
| | | | CO 2: study the solid solutions its solubility and diffusion in solids. |
| | | | CO 3: understand the theory of metallurgical thermodynamics. |
| | | | CO 4: understand the topology of binary phase diagrams: eutectic, peritectic, monotectic, eutectoid, peritectoid, syntactic reaction,extension rule. |
| MSc Sem IV | PHCP-235 | Physics Laboratory - III | CO 1:find the inverse of an matrix. |
| | | | CO 2: Interpolate the value of a function at a point by Lagrange interpolationmethod. |
| | | | CO 3: Evaluate a given function f(x) using trapezoidal/ Simpson rulecorrect up to given accuracy by successively halving the step size |
| | | | CO 4: write a program and display the Miller planes in the cubic lattice. |
| | | | CO 5: write the differential equation for charging /discharging of a capacitorthrough a resistance. |
| | | | CO 6: write a program to graphically display eigen functions and probability density curves for |
| | PHCT-241 | Nuclear Physics | CO 1: understand general properties and concepts of nuclei. |

| Class | Subject code | Title | Cos: After successful completion of this course, student will be able to |
|---|---|---|---|
| | | | CO 2: understand the principle of radiation detectors and nuclear models. |
| | | | CO 3: understand reaction Dynamics, nuclear reactors and accelerators. |
| | | | CO 4: understand the principle of nuclear interactions and particle physics. |
| | | | CO 5: understand the elementary particles, Quarks and Higgs Boson concept. |
| | PHCT-242 | Experimental Techniques in Physics-II | CO 1: understand the Different types of radiations (γ -rays, X-rays, UV-VIS, IR, microwaves) and their sources. |
| | | | CO 2: study the Techniques used for XRD, Thermo-gravimetric (TGA), Differential Thermal Analysis (DTA). |
| | | | CO 3: study the Morphological and Magnetic Characterization used to study the materials. |
| | | | CO 4: understand the principles of Fourier Transform Infra-Red (FTIR), Ultraviolet-Visible (UV-VIS), Diffused Reflectance Spectroscopy (DRS), X-ray Absorption (XPS), Electron Spin Resonance(ESR), Nuclear Magnetic Resonance (NMR), Raman Spectroscopy. |
| | PHOT-243 | Physics of Thin Films | CO 1: study the growth of thin films its nucleation and condensation. |
| | | | CO 2: study the different deposition techniques such as Physical Vapour Deposition, Chemical Vapour Deposition, Molecular Beam Epitaxy, Sputtering, Spray pyrolysis, Dip coating and Spin coating. |
| | | | CO 3: study the electrical properties of thin films. |
| | | | CO 4: study the applications of thin films in solar cell, sensor, communication, etc. |

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