

Vijayanagara Sri Krishnadevaraya University, Ballari

Department of Studies in Physics

Programme: Master of Science (M.Sc.) in Physics

Programme Outcomes (POs):

At the end of the programme the students will be able to:

PO1: Apply the domain knowledge solve to practical problems.

PO2: Apply the mathematical techniques to interpret behavior of physical systems.

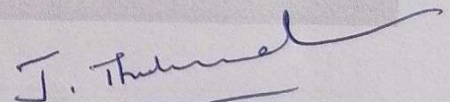
PO3: Demonstrate the ability to design & execute experiments, and analyse the results.

PO4: Demonstrate the ability to propose and execute a research project, and ethically report the results with concern for society and environment.

PO5: Work in a group to execute a project and contribute as an individual.

PO6: Effectively communicate the concepts, applications and research results in physics (both written and oral).

PO7: Develop lifelong learning habits by continuously updating advances in physics / science.


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Course Outcomes:

M.Sc. Physics (Semester I) (CBCS): 2016-17 Scheme

I Semester

COURSE: MATHEMATICAL PHYSICS I (PH HCT 110)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Apply differential equations and special functions to physical problems.
CO-2	Apply Fourier series and integral transforms to physical situations.
CO-3	Understand concepts and methods in Matrices and Tensors.
CO-4	Write a Fortran program for some simple physics problems.

COURSE: QUANTUM MECHANICS I (PH HCT 120)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Understand physical basis of quantum mechanics and Schrodinger wave equation.
CO-2	Solve few one dimensional and three dimensional Eigen value problems.
CO-3	Understand general formulism of quantum mechanics.
CO-4	Understand approximation methods for stationary states and theory of scattering.

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COURSE: ATOMIC, MOLECULAR AND OPTICAL PHYSICS (PH HCT 130)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Understand fundamental concepts in atomic physics.
CO-2	Understand the concepts of rotational molecular spectroscopy and Raman spectroscopy.
CO-3	Understand the concepts of Vibrational and electronic spectroscopy.
CO-4	Understand the concepts and applications of lasers & Optical fibers.

COURSE: ELECTRONICS (PH SCT 140)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Understand fundamental ideas in Bipolar junction transistor.
CO-2	Understand the basic ideas in OP-Amps, Active filters and Signal generators.
CO-3	Understand the concepts ICs, digital electronics and logic gates.
CO-4	Understand the sequential circuits, A/D, D/A conversion circuits.

Practical I: ELECTRONICS LAB I (PH HCP 150)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Design the basic electronic circuits.
CO-2	Study the basic characteristics of basic electronic circuits.
CO-3	Analyse characteristics of basic electronic circuits.

PRACTICAL II: GENERAL AND COMPUTATIONAL LAB I (PH HCP 160)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Design few experiments in general physics.
CO-2	Study the basic characteristics of few devices in general physics.
CO-3	Verify basic theorems/laws/distributions in general physics
CO-4	Write and execute a computer program for simple physical problems.

COURSE: ASTROPHYSICS (PH SCT 141)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Understand fundamental concepts in Astrophysics.
CO-2	Understand the basic properties of stars.
CO-3	Understand the fundamentals of solar system.
CO-4	Understand the concepts of Star clusters, galaxies and the universe.

II Semester

COURSE: MATHEMATICAL PHYSICS II (PH HCT 210)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Apply complex analysis and vector analysis to simple physical problems.
CO-2	Understand basics group theory and its applications in physics.
CO-3	Understand methods of few numerical techniques.
CO-4	Write C-Programming for simple physics problems and understand the PC based instrumentation.

COURSE: QUANTUM MECHANICS II (PH HCT 220)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Understand time –dependant phenomenon by using concepts in quantum mechanics .
CO-2	Understand identical particles, angular momentum and symmetry principles.
CO-3	Understand relativistic equations in quantum mechanics.
CO-4	Understand the concepts in quantization of fields.

COURSE: ELEMENTS OF SOLID STATE PHYSICS (PH SCT 230)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Understand the fundamentals of crystal structure and X-ray diffraction.
CO-2	Understand binding in crystals and lattice vibrations.
CO-3	Understand concepts of energy bands in solids and types of defects.
CO-4	Understand the basic concepts in semiconductors and superconductors.

COURSE: ELEMENTS OF NUCLEAR PHYSICS (PH SCT 240)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Understand the basic properties of nucleus and nuclear forces.
CO-2	Understand the fundamental nuclear reactions and nuclear models.
CO-3	Understand nuclear decay types and fundamentals of interaction of radiation with matter.
CO-4	Understand the basics nuclear energy, fundamental interactions and elementary particles.

PRACTICAL III: Optics lab (PH HCP 260)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Set-up basic experiments in optics.
CO-2	Determine the basic properties of light using experimental methods. .
CO-3	Verify basic laws in optics.

PRACTICAL IV: GENERAL AND COMPUTATIONAL LAB II (PH HCP 270)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Set-up basic experiments in general physics.
CO-2	Determine the basic physical constants of materials/other general constants by experimental techniques.
CO-3	Verify few laws in physics.
CO-4	Write and execute a computer program for simple physical problems.

COURSE: ATMOSPHERIC AND SPACE SCIENCE (PH SCT 241)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Understand fundamental ideas in physical Meteorology and atmospheric pollution.
CO-2	Understand the concepts in optics of the atmosphere and atmospheric instrumentation systems.
CO-3	Understand the concepts in orbital motion and space dynamics.
CO-4	Understand the methods in remote sensing.

COURSE: MODERN PHYSICS (PH OET 250)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Understand the basic concepts and devices in electronics.
CO-2	Understand the basic concepts in Nuclear physics and astronomy.
CO-3	Understand the basic concepts in condensed matter physics and thermodynamics.
CO-4	Understand the basic phenomenon in optics and idea about lasers.

COURSE: GENERAL PHYSICS (PH OET 251)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Understand the basic concepts mechanics and heat.
CO-2	Understand the fundamentals of electricity and magnetism.
CO-3	Understand the basic phenomena of light.
CO-4	Understand the basic concepts of atomic and nuclear physics.

III Semester

COURSE: CLASSICAL MECHANICS (PH HCT 310)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Understand and Apply Newtonian mechanics to some physical situations.
CO-2	Understand and Apply Lagrangian formalism to some physical situations.
CO-3	Understand and Apply Hamiltonian formalism to some physical situations.
CO-4	Understand the fundamentals of relativistic mechanics and continuum mechanics.

COURSE: ELECTRODYNAMICS AND PLASMA PHYSICS (PH HCT 320)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Understand principles and laws in electro and magnetostatics. .
CO-2	Understand Maxwell's equations and their applications to concepts involving electromagnetic waves.
CO-3	Understand fundamental ideas in electromagnetic radiation and fields.
CO-4	Understand the fundamentals of plasma and related phenomena.

COURSE: SOLID STATE PHYSICS I (PH SCT 330)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Understand basic concepts of periodic structures and applications different electron models.
CO-2	Understand concepts related to lattice vibrations and lattice waves in solids.
CO-3	Understand concepts related to thermal and elastic properties of solids.
CO-4	Understand the fundamentals of Fermi surface in solids and related phenomena.

COURSE: NUCLEAR PHYSICS I (PH SCT 331)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Understand basic properties of nucleus, concepts related to electric quadropole moment and beta decay.
CO-2	Understand different nuclear radiation detectors and their working & applications.
CO-3	Understand concepts related to thermal and elastic properties of solids.
CO-4	Understand the fundamentals of nuclear electronics used in nuclear technology.

COURSE: SOLID STATE PHYSICS II (PH SCT 340)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Understand the transport properties of metals & semiconductors and related phenomena.
CO-2	Understand the dielectric properties of materials, ferroelectricity and related concepts.
CO-3	Understand magnetic properties of materials based on different theories.
CO-4	Understand superconductivity phenomenon, associated theories and applications.

COURSE: NUCLEAR PHYSICS II (PH SCT 341)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Understand principles of nuclear spectroscopy, gamma ray spectroscopy and related instrumentation.
CO-2	Understand basic principles of different nuclear techniques for material characterization.
CO-3	Understand deuteron problem and concepts associated with nuclear forces.
CO-4	Understand various nucleon-nucleon scattering mechanisms and associated concepts.

PRACTICAL V: SOLID STATE PHYSICS LAB I (PH HCP 350)

Course Outcomes (CO): After completion of this course student should be able to

CO	Statement
CO-1	Set-up basic experiments in solid state physics.
CO-2	Determine the basic physical constants of materials by experimental techniques.
CO-3	Compute structure factor in crystals.

PRACTICAL V: NUCLEAR LAB I (PH HCP 351)

Course Outcomes (CO): After completion of this course student should be able to

CO	Statement
CO-1	Set-up basic experiments in nuclear physics.
CO-2	Determine the basic physical parameters of nuclear radiations/radioactive sources.
CO-3	Compute stopping power, energy loss, nuclear mass and binding energy.

PRACTICAL VI: SOLID STATE PHYSICS LAB II (PH HCP 360)

Course Outcomes (CO): After completion of this course student should be able to

CO	Statement
CO-1	Set-up basic experiments in solid state physics.
CO-2	Determine the basic physical constants of materials by experimental techniques.
CO-3	Compute intensities in X-ray powder pattern.

PRACTICAL V: NUCLEAR LAB II (PH HCP 361)

Course Outcomes (CO): After completion of this course student should be able to

CO	Statement
CO-1	Set-up basic experiments in nuclear physics and also related to solar radiation.
CO-2	Determine the basic physical parameters of nuclear radiations/radioactive sources/solar devices.
CO-3	Understand nuclear models and analyse nuclear structure.

COURSE: ENERGY SCIENCE (PH OET 370)

Course Outcomes (CO): After completion of this course student should be able to

CO	Statement
CO-1	Understand laws of thermodynamics and their applications.
CO-2	Understand various renewable energy resources and related concepts.
CO-3	Understand production of biomass energy.
CO-4	Understand fundamentals of biogas technology.

COURSE: RADIATION PHYSICS (PH OET 371)

Course Outcomes (CO): After completion of this course student should be able to

CO	Statement
CO-1	Understand different nuclear radiations and their interaction with matter.
CO-2	Understand biological effects of radiation.
CO-3	Understand radiation protection in medicine.
CO-4	Understand fundamentals of lasers and their few applications.

IV Semester

COURSE: STATISTICAL MECHANICS (PH HCT 410)

Course Outcomes (CO): After completion of this course student should be able to

CO	Statement
CO-1	Understand basic ideas in thermodynamics and statistical mechanics.
CO-2	Understand various partition functions and their usefulness in determining thermodynamic potentials.
CO-3	Understand different statistics and their physical applications.
CO-4	Understand fluctuations, irreversible thermodynamics and related concepts.

COURSE: ANALYTICAL TECHNIQUES AND INSTRUMENTATION (PH HCT 420)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Understand basic principles and applications of spectrophotometry, Thermal analyses techniques & X-ray spectrometry.
CO-2	Understand basic principles and applications of Electron and Ion spectroscopic techniques.
CO-3	Understand basic principles and applications of optical, electrical and magnetic resonance techniques.
CO-4	Understand basic principles and applications of nuclear, low temperature and vacuum techniques.

COURSE: SOLID STATE PHYSICS III (PH SCT 430)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Understand magnetic resonance techniques and related concepts.
CO-2	Understand optical properties of semiconductors, low dimensional semiconductor structures and amorphous semiconductors.
CO-3	Understand elastic properties of materials including ductility, plastic deformation and creep.
CO-4	Understand general and AC properties of ferrites, and their applications.

COURSE: NUCLEAR PHYSICS III (PH SCT 431)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Understand different nuclear models with a specific emphasis of shell model.
CO-2	Understand nuclear collective model and related concepts.
CO-3	Understand nuclear reactions and related concepts.
CO-4	Understand basic ideas of heavy ion physics.

COURSE: SOLID STATE PHYSICS IV (PH SCT 440)

Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Understand transport properties, magnetic field effects and optical properties of semiconductors.
CO-2	Understand principle of working and applications of semiconductors devices.
CO-3	Understand principle of working and applications photovoltaic converters.
CO-4	Understand different synthesizing and characterization methods of nanomaterials.

COURSE: NUCLEAR PHYSICS IV (PH SCT 441)

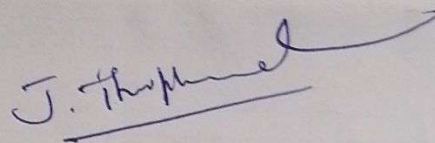
Course Outcomes (CO): After completion of this course student should able to

CO	Statement
CO-1	Understand neutron physics and related concepts.
CO-2	Understand fundamentals ideas and related phenomena in reactor physics.
CO-3	Understand fundamentals ideas and related phenomena in particle physics.
CO-4	Understand fundamentals of strange particles and unified model..

COURSE: PROJECT

Course Outcomes (CO): After completion of the project student should able to

CO	Statement
CO-1	Conduct literature survey on specified area of research.
CO-2	Define or state the research problem.
CO-3	Plan the activities of the project and its timeline.
CO-4	Identify requirements of hardware/software for performing specified project.
CO-5	Conduct investigations on defined research problem.
CO-6	Analyze experimental observations by scientific methods.
CO-7	Report results of investigation ethically with concern for society/environment.
CO-8	Work effectively in a team and contribute independently.
CO-9	Communicate (oral and written) the results of investigation.



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