COURSE OUTCOME OF M.Sc. in PHYSICS

M.Sc. Physics Courses

SEMESTER - I

Course	Course Outcome (CO)
Course No: PHS 101.1: Methods of Mathematical Physics (Marks: 25 Credit 2 Classes: 20)	The course - Mathematical Physics - provides a tool to realize the laws of physics and focused on a rigorous exposition to some of the principles of mathematical physics. Offers a sound knowledge of vector space and matrices. Provides a good knowledge of special functions and their various properties that are being extensively used in physics. Focuses on techniques of complex variables and tensor analysis. At the end of the course, students will be able to identify a range of mathematical methods that are essential for solving advanced problems in theoretical physics, interpret and illustrate the interactions between mathematics and the associated field and demonstrate the ability to apply mathematical concepts and techniques in to problems in that field, elaborate the understanding of basic concept of complex variables. The students should be able to formulate and express a physical law in terms of tensors, and simplify it by use of coordinate transforms. Also analyse the wide range of special functions and transformations of different series. Describe various processes involved in understanding the behaviour of different systems through mathematics. Implement mathematical skills to solve problems in advanced physics.
Course No: PHS 101.2: Classical Mechanics (Marks: 25 Credit 2 Classes: 20)	In the era of modern physics, this course in classical mechanics remained absolutely essential in the way it is designed. Firstly this course acts as the stepping stone for the various branches of modern physics. e.g. the technique of action-angle variable is needed for older quantum mechanics, the Hamilton Jacobi formalism and the principle of least action paved the way to wave mechanics and the Poisson Bracket and canonical transformation leads to the justification of commutator formalisms and equation of motions. This course also provides an opportunity for students of physics to master many of the mathematical techniques.
Course No: PHS 102.1: Quantum Mechanics-I (Marks: 25 Credit 2 Classes: 20)	Quantum mechanics is the body of scientific laws that describe the wacky behavior of photons, electrons and the other particles that make up the universe. Quantum mechanics is the branch of physics relating to the very small. It results in what may appear to be some very strange conclusions about the physical world. Quantum mechanics was once mostly of interest to physicists, chemists and other basic scientists. Now the concepts and techniques of quantum mechanics are essential in many areas of engineering and science such as materials science, nanotechnology, electronic devices, and photonics. This course is a substantial introduction to advanced quantum mechanics and how to use it. It is specifically designed to be accessible not only to physicists but also to students and technical professionals over a wide range of applied science. At the end of the course, students will be able to identify and understand the kinds of experimental results which are incompatible with classical physics and which required the development of a quantum theory of matter and light, to interpret the wave function and apply operators to it to obtain information about a particle's physical properties such as position, momentum and energy, solve the Schrodinger equation to obtain wave functions for some basic, physically important types of potential in one dimension, and estimate the shape of the wave function based on the shape of the potential, Hydrogen atom problem and Harmonic Oscillator

	problem, to apply the technique of separation of variables to solve problems in more than one dimension and to understand the role of degeneracy in the occurrence of electron shell structure in atoms. The problems can be solved in different pictures to calculate correlation function used in applied science.
Course No: PHS 102.2: Solid State-1 (Marks: 25 Credit 2 Classes:20)	The course gives good idea to students related to structure and symmetry of solid. The course also gives light to the structural analysis of the materials and introduce new particle phonon in solid.The course deals with Band Theory of Solid which is an important tool for material study and research
Course No: PHS 103.1: Electrodynamics (Marks: 25 Credit 2 Classes: 25)	The aim and objective of the course on Electrodynamics is to familiarize the students of M.Sc. class to know the fundamental concepts about plasma, the mechanism of radiation by free charges of plasma, and excited atoms and ions; and their current transport. To evaluate fields and forces in Electrodynamics and Magneto dynamics using basic scientific method. To provide concepts of Retarded phenomena and radiation by different material media and corresponding scattering dispersion relations. The students will have an understanding the relativistic electrodynamics. The students will be able to analyze s radiation systems in which the electric dipole, magnetic dipole or electric quadruple dominate. The students will have an understanding of the covariant formulation of electrodynamics and the concept of retarded time for charges undergoing acceleration.
Course No: PHS 103.2: Materials: Preparation and Characterization (Marks: 25 Credit 2 Classes: 20)	The course is typically a bridge between a physicist and a material scientist and the course is framed to enable students to understand the 1. expanding world of functional materials 2. state of the art facts and techniques involved in materials preparation 3. comprehensive awareness of use of different instruments for material study. 4. development of the various aspects of material characterization. 5. use of different experimental techniques, challenges and prospects materials science
Course No: PHS 104.1: Analog Electronics-I (Marks: 25 Credit 2 Classes: 20)	At the end of the course, students will be able to 1. impart basic knowledge on Analog and Digital Electronics. 2. clarify and exemplify the previous knowledge of electronics in B.Sc. courses. 3. learn the basics of Op-Amp circuits and Analog communication systems. 4. gain knowledge on Radar, Antenna and MOSFET circuits.
Course No: PHS 104.2: Digital Electronics-I (Marks: 25 Credit 2 Classes: 20)	At the end of the course, students will be able to 1. gain basic knowledge of application of Digital Logic gates. 2. learn the structure and use of flip flops, counters, registers etc
Course No: PHS 195: Electronics Practical-I (Credit 4 Marks: 50	With this course, students will be able to design and fabricate various digital and analog electronic circuits, e.g. Op-Amp amplifiers, oscillator circuits.

Class: 40)	
Course No: **PHS 196:** **Computer** **Programming** Credit 4 Marks: 50	The students get good training in computer programming. The programming knowledge will help them in Higher Study and Research.

SEMESTER- II

Course	Course Outcome (CO)
Course No: **PHS 201.1:** **Quantum** **Mechanics-II** (Marks: 25 Credit 2 Classes: 20)	At the end of the course, students will be able to apply the postulates of Quantum Mechanics to rotational motion Student uses the commutation relations to understand the link between the angular momentum operator and the generator of rotations. Student can compute the eigen systems of $\hat{L}2$ and $\hat{L}z$. Student understands the interpretation of these eigen systems. Student can compute the coefficients of the expansion of the angular part of a wave function in terms of spherical harmonics. Student can find the matrix elements of the operators corresponding to the addition of angular momenta in both the uncoupled and the coupled basis. Understand the concept of spin, Pauli spin matrices. Addition of angular momenta, Clebsch-Gordon coefficients and their properties, recursion relations. Knowledge of Matrix elements for rotated state, irreducible tensor operator. Understand the application of non-relativistic Hamiltonian for an electron with spin included. C.G. coefficients of addition for j==1/2, 1/2; 1/2, 1; 1, 1. Perform calculations using angular momentum techniques, including the Wigner-Eckart theorem. The aim and objective of the course is to introduce the techniques of Relativistic quantum mechanics so that he/she can use these in various branches of physics as per his/her requirement.
Course No: **PHS 201.2:** **Methods of** **Mathematical** **Physics - II** (Credit 2 Marks: 25 Classes: 20)	The course - Mathematical Physics - provides a tool to realize the laws of physics and focused on a rigorous exposition to some of the principles of mathematical physics. Offers a sound knowledge of integral and Fourier transform. Focuses on techniques of group theory. At the end of the course, students will be able to identify a range of mathematical methods that are essential for solving advanced problems in theoretical physics, interpret and illustrate the interactions between mathematics and the associated field and demonstrate the ability to apply mathematical concepts and techniques in to problems in that field, elaborate the understanding of basic concept of Fourier and Laplace's transform. Understand the applications of group theory in all the branches of Physics problems. Use Fourier series and transformations as an aid for analyzing experimental data. Use integral transform to solve mathematical problems of interest in Physics. Develop mathematical skills to solve quantitative problems in physics.
Course No: **PHS 202.1:** **Solid State II** (Marks: 25 Credit 2 Classes: 20)	This course is combined with the basic theory and phenomenology of superconductivity and dielectrics and their many applications in basic science and technology. The course on superconductivity includes the electrical and magnetic properties of superconductors, the thermodynamics of superconductors, the origin of quantized magnetic flux and the Josephson tunneling. The dielectrics course is devoted to the study of dielectric polarization and relaxation phenomena in condensed matter. Basic theory and different experimental techniques of dielectrics are given.
Course No:	Students are enriched in semiconductor field by taking the course. Most modern

PHS 202.2: Semiconductor Physics (Marks: 25 Credit 2 Classes: 20)	Devices are based on semiconductors. Hence it is important to know the basics of Semiconductors. The students will hence understand the operation and mechanism of important semiconducting devices. The course will also provide interest to students for research in semiconducting field.
Course No: PHS 203.1: Analog Electronics-II (Marks: 25 Credit 2 Classes: 20)	After completion of this course, students will be able 1. to achieve the detail knowledge of network analysis. 2. to gain knowledge on transmission lines: its theory and application. 3. to understand the operation of different transducers like LED, Laser diode, photo detectors, solar cells, thermistor etc. 4. to gain knowledge on different combinational circuits like MUX, DeMUX, Encoder, Decoder, etc.
Course No: PHS 203.2: Digital electronics-II (Marks: 25 Credit 2 Classes: 20)	After completion of this course, students will be able 1. to understand the basic structure of 8085 microprocessor. 2. to learn the structure and use of different memory units. 3. to gain basic idea of digital communication.
Course No: PHS 204: Concepts of Physics: Inventions and applications (CBCS) (Marks: 50 Credit 4 Classes: 40)	The course is offered to introduce the basic concepts of modern physics to the students coming from outside the Physics Department as a choice based subject. The course is aimed to offer the students to understand the important developments of physical Science, physics of Nature, electrical conductivity, electromagnetic wave, development of different light sources, applied optics, medical instrumentation and working principles of different instruments.
Course No: PHS 295: Electronics Practical-II (Credit 4 Marks: 50)	This course will help the students to design and fabricate various digital and analog electronic circuits, e.g. counters, multivibrators, oscillator circuits.
Course No: PHS 296: Advance Practical-I (Credit 4 Marks: 50)	This practical course structure is designed to impart the students to provide strong hands-on laboratory training in modern, currently active, areas of Physics particularly in optics, semiconductor physics and nuclear physics.

SEMESTER- III

Course	Course Outcome (CO)
Course No: PHS 301.1: Quantum Mechanics-III Marks: 25 Credit 2 Classes: 20	At the end of the course, students will be able to provide an understanding of the formalism and language of non-relativistic quantum mechanics and various approximation methods. To understand the concepts of time-independent perturbation theory and their applications to physical situations and quantum scattering theory which are applicable in nuclear and particle physics. The students will be able to formulate and solve problems in quantum mechanics using Dirac representation. The students will be able to grasp the concepts of spin and angular momentum, as well as their quantization and addition rules. The students will be familiar with various approximation methods applied to atomic, nuclear and solid-state physics.
Course No: PHS 301.2: Statistical Mechanics - I (Marks: 25 Credit 2 Classes: 20)	The aim and objective of the course on Statistical Mechanics is to equip the M.Sc. student with the techniques of Ensemble theory so that he/she can use these to understand the macroscopic properties of the matter in bulk in terms of its microscopic constituents. The students will be able to work out equations of state and thermodynamic potentials for elementary systems of particles. To have an appreciation for the modern aspects of equilibrium and non-equilibrium statistical physics. To describe the features and examples of Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics. At the end of the course, the student will be able to understand Equations of state and thermodynamic potentials for elementary systems of particles. Learning the Modern aspects of equilibrium and nonequilibrium statistical Physics. Describe the features and examples of Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac statistics. Work with various models of phase transitions and thermodynamical fluctuations. Describe physical quantities in quantum systems.
Course No: PHS 302.1: Molecular Spectroscopy & Laser Physics (Marks: 25 Credit 2 Classes: 20)	This course is combined with the basic theory and phenomenology of Laser Physics and provides an introduction to molecular spectroscopy. The course on laser physics provides an insight into the physical principles of operation of lasers, construction of laser, and their applications in different areas of science and industry. This course also covers different methods of Q-switching for the generation of ultra-short laser pulse. The course on molecular spectroscopy introduces the three key spectroscopic methods used by physicist, chemist and biochemist to analyze the molecular and electronic structure of atoms and molecules. These are Rotational, Vibrational and Electronic spectroscopy. Numerous exercises are provided to facilitate mastery of each topic
Course No: PHS 302.2: Nuclear Physics-I (Marks: 25 Credit 2 Classes: 20)	The aim and objective of the course on Nuclear Physics is to familiarize the students of M.Sc. class to the basic aspects of Nuclear Physics like static properties of nuclei and three radioactive decays. The main objectives of this course are to understand the basic properties of nucleus; to develop the understanding of nuclear properties and different nuclear spectroscopy. At the end of the course, students will be able to acquire basic knowledge about nuclear properties such as mass, spin, radius, binding energy and radioactive decay.
PHS 303A: Solid State Physics -I	The course topic is Solid State Physics special paper which covers large part in this field. The course enriches the student in many fields like defects in solid and introduces

(Marks: 50 Credit 4 Classes: 40)	important new particles like Plasmon, Polariton, Polaron, Exciton. The course also includes Luminescence in solid and transport properties of metal. The course also describes the origin of Landau Levels. The course will motivate the students to do research in these fields both in Theoretical as well as Experimental Solid State physics.
Course No: PHS 303B.1: Applied Analog Electronics-I (Marks-25 Credit 2)	To develop the concepts of electronics in order to strengthen the understanding of electronic devices those are the part of our surrounding technologies. After completion of this course, students will be able to 1. achieve detail knowledge of application oriented Op-Amp circuits. 2. understand details inside the linear and switched mode regulated power supplies. 3. know the components, operation and use of phase locked loop.
Course No: PHS 303B.2: Applied Digital Electronics-I (Marks-25 Credit 2)	To develop the concepts of electronics in order to strengthen the understanding of electronic devices those are the part of our surrounding technologies. 1. to get details of different logic families like DTL, TTL, ECL, MOS, CMOS, etc. 2. to understand the in-depth knowledge of different memory units. 3. to gain basic knowledge of advanced communication systems like mobile & computer communication
Course No: PHS 303C: Applied Optics and Opto-electronics – I (Marks: 50 Credit 4 Classes: 40)	The course is important to train the students in important topic i.e applied optics and optoelectronics. The students will be enriched to do research in important fields like Fiber Optics, Optoelctronics, and Semiconductor laser.
Course No: PHS 304: Introductory Astrophysics (CBCS) (Marks: 50 Credit 4 Classes: 40)	The course is arranged to introduce the basic concepts of astrophysics to the students coming from other than physics department as a choice based subject. The course is framed to enable students to understand the 1. Fundamental concept of Universe 2. Stars, galaxy and other celestial objects 3. Different parameters for astrophysical measurements 4. details of Sun and solar system and related phenomena
Course No: PHS 395: Advance Practical-II (Practical) (Credit 4 Marks: 50)	This practical course structure is designed to impart the students to provide strong hands on laboratory training in modern, currently active, areas of Physics particularly in optics, semiconductor physics and nuclear physics.
Course No: PHS 396A: Solid State Physics-I (Practical) (Credit 4 Marks: 50)	This practical course structure is designed to impart the students to provide strong hands on laboratory training especially in the advance field of Solid State Physics. This will help them immensely for research in condensed matter physics as well as experimental research in Solid State Physics.
Course No: PHS 396B: Applied	This course will help the students to (i) design and fabricate various advanced digital and analog electronic circuits, e.g. Mux, DeMUX, registers, voltage regulators, active filters etc.

Course	Course Outcome (CO)
Electronics-I (Practical) (Credit 4 Marks: 50)	(ii) design and conduct various electronics experiments. The experiments will help the students to understand the application of the theories in practical field.
Course No: PHS 396C: Applied optics and opto-electronics-I (Practical) (Credit 4 Marks: 50)	This practical course structure is designed to impart the students to provide strong hands on laboratory training especially in the advance field of Optoelectronics. This will help them immensely for research in Semiconductor Laser and .Fiber Optics.

SEMESTER- IV

Course	Course Outcome (CO)
Course no – PHS 401.1: Particle Physics (Marks: 25 Credit 2 Classes: 20)	The aim and objective of the course on Particle Physics is to introduce the M.Sc. students to the invariance principles and conservation laws, hadron-hadron interactions, relativistic kinematics, static quark model of hadrons and weak interactions so that they grasp the basics of fundamental particles in proper perspective. At the end of the course, the student will be able to understand overview of particle spectrum, their interaction and major historical and latest developments, Various invariance principles and symmetry properties in particle physics, Basic rules of Feynman diagrams and the quark model for hadrons, Properties of neutrons and protons in term.
Course No: PHS 401.2: Statistical Mechanics-II (Marks: 25 Credit 2 Classes : 20)	At the end of the course, the student will be able to understand different quantum statistics for explanation of B.E. condensation, Black body radiations, Pauli paramagnetism, Landau diamagnetism and electron gas systems for thermionic and photoelectric emission; also to use and develop mean field theory for first and second order phase transitions in one and two dimensional Ising model.
Course No: PHS 402.1: Nuclear Physics-II (Marks: 25 Credit 2 Classes: 20)	At the end of the course, students will be able to understand the features of nuclear forces, exchange force and meson theory; to develop the understanding of nucleon-nucleon interactions; to develop the understanding of resonance reactions; to understand the various nuclear models; to understand the different nuclear reactions; to clarify the concepts of elementary particles; and to learn about the concept of subatomic particle and quarks, conservation laws. The most commonly known applications of nuclear physics are nuclear power generation.
Course No: PHS 402.2: Quantum Field Theory (Marks: 25	At the end of the course, students will be able to understand Quantum field theory so that he/she can use these in various branches of physics as per his/her requirement. Understand relativistic effects in quantum mechanics and need for quantum field theory. Demonstrate the Lorentz covariant form of Lagrangian and Hamiltonian for scalar, vector fields,

Credit 2 Classes: 20)	electromagnetic fields and their second quantisation. Understand the symmetries and the implications of Noether's Theorem in conserved currents and charges. Understand the interaction picture, S-matrix, and Wick's Theorem. Explain the origin of Feynman diagrams and apply the Feynman rules to derive the amplitudes for elementary processes in QED.
Course No: **PHS 403.1:** **Semiconductor** **Devices** Marks: 25 Credit 2 Classes: 20	Most of the devices are based on semiconductors. The course discusses in details the various devices and their operation mechanism. The course describes extensively many important devices like Gunn Diode, FET, MOSFET, Semiconductor Laser. The course also includes important topic like Quantum Hall Effect, Thermoelectric effect in Semiconductors. The course will encourage the students to do researches in Semiconducting devices which is an important topic of Applied Physics.
Course No: **PHS 403.2:** **Applied Optics** (Marks: 25 Credit 2 Classes: 20)	The course is an introduction to the fundamentals of optoelectronics and principles of the optoelectronic devices operation. This course helps students prepare them for advanced study and research in semiconductor optics and optoelectronic devices. Topics include optical waveguides, optical logic operations, nonlinear optics an introduction to different types of detectors, and holography. The course also covers the basic optical and electro-optical properties of semiconductors and low-dimensional semiconductor structures.
Course No: **PHS 404A:** **Solid State** **Physics - II** **(Marks: 50** **Credit 4** **Classes: 40)**	The course topic is Solid State Phyicics special paper which covers large part in this field The course enriches the student in many field like Magnetism, Superconductivity which are two important branches of Physics. The course will motivate the students to do research in these fields both in Theoretical as well as Experimental Solid State physics.
PHS 404B.1: **Applied Analog** **Electronics –II** (Credit 2 Marks: 25)	To develop the relevant knowledge of electronics in order to deepen the understanding of modern electronic communication devices those are associated with our social life. After completion of this course, students will be able to 1. gain in-depth knowledge of monochrome and colour television principle. 2. know the details of signal propagation through wave guide. 3. understand the principle behind instrumentation for different measurements.
PHS 404B.2: **Applied Digital** **Electronics –II** (Credit 2 Marks: 25)	To develop the relevant knowledge of electronics in order to deepen the understanding of modern electronic communication devices those are associated with our social life. After completion of this course, students will be able 1. to get details of digital communication including different digital modulation techniques. 2. to develop knowledge on 8085 and 8086 microprocessors with programming
Course No: **PHS 404C:** **Applied Optics** **and Opto-** **electronics – II** **(Marks: 50** **Credit 4)**	The course is important to train the students in important topic i.e applied optics and optoelectronics. The students will be enriched to do research in important fields like Fiber Optics, Optoelctronics, Semiconductor laser.
Course No: **PHS 495A: Solid**	This practical course structure is designed to impart the students to provide strong hands on laboratory training specially in the advance field of Solid State Physics.

State Physics -II (Practical) (Credit 4 Marks: 50)	This will help them immensely for research in condensed matter physics as well as experimental research in Solid State Physics.
Course No: PHS 495B: Applied Electronics –II (Practical) (Credit 4 Marks: 50)	This course will help the students to (i) design and fabricate various advanced digital and analog electronic circuits, e.g. modulator circuits, PLL circuits, Microprocessor programming, etc. (ii) design and conduct various electronics experiments. The experiments will help the students to understand the application of the theories in practical field.
Course No: PHS 495C: Applied optics and Opto-electronics-II (Practical) (Credit 4 Marks: 50)	This practical course structure is designed to impart the students to provide strong hands on laboratory training specially in the advance field of Optoelectronics. This will help them immensely for research in Semiconductor Laser and Fiber Optics.
Course No: PHS 496: PROJECT, SEMINAR AND GRAND VIVA Credit 4 Marks: 50	A significant aspect of this particular curriculum is the opening that the students will have to perform a dissertation research project during their last two semesters on wide range of modern-day topics under the guidance of any of the faculty members of Physics department and the exam will be held at the end of fourth semester. This gives an ideal atmosphere for converting class room learning to cutting-edge research applications. Each student has to present a seminar in the final semester. There is a good interacting session in the seminar. Thus seminar gives a good training to student and gives encouragement to be a participant of National and International Seminar.

Program Outcomes (PO) relating to M.Sc Courses in Physics

1. Program Learning Outcomes in M.Sc. Physics

The student post-graduating with the Degree M.Sc.

☐ Acquire
(i) a fundamental/systematic or coherent understanding of the academic field of Physics, its different learning areas and applications in basic Physics like Astrophysics, Material science, Nuclear and Particle Physics, Condensed matter Physics, Atomic and Molecular Physics, Mathematical Physics, Analytical dynamics, Space science, and its linkages with related disciplinary areas / subjects like Chemistry, Mathematics, Life sciences, Environmental sciences, Atmospheric Physics, Computer science, Information Technology;
(ii) procedural knowledge that creates different types of professionals related to the disciplinary/subject area of Physics, including professionals engaged in research and development, teaching and government/public service;

(iii) skills in areas related to one's specialization area within the disciplinary/subject area of Physics and current and emerging developments in the field of Physics.

☐ Demonstrate the ability to use skills in Physics and its related areas of technology for formulating and tackling Physics-related problems and identifying and applying appropriate physical principles and methodologies to solve a wide range of problems associated with Physics.

☐ Recognize the importance of mathematical modeling simulation and computing, and the role of approximation and mathematical approaches to describing the physical world.

☐ Plan and execute Physics-related experiments or investigations, analyze and interpret data/information collected using appropriate methods, including the use of appropriate software such as programming languages and purpose-written packages, and report accurately the findings of the experiment/investigations while relating the conclusions/findings to relevant theories of Physics.

☐ Demonstrate relevant generic skills and global competencies such as (i) problem-solving skills that are required to solve different types of Physics-related problems with well-defined solutions, and tackle open-ended problems that belong to the disciplinary-area boundaries; (ii) investigative skills, including skills of independent investigation of Physics-related issues and problems; (iii) communication skills involving the ability to listen carefully, to read texts and research papers analytically and to present complex information in a concise manner to different groups/audiences of technical or popular nature; (iv) analytical skills involving paying attention to detail and ability to construct logical arguments using correct technical language related to Physics and ability to translate them with popular language when needed; (v) ICT skills; (vi) personal skills such as the ability to work both independently and in a group.

☐ Demonstrate professional behavior such as (i) being objective, unbiased and truthful in all aspects of work and avoiding unethical, irrational behavior such as fabricating, falsifying or misrepresenting data or committing plagiarism; (ii)the ability to identify the potential ethical issues in work-related situations; (iii) appreciation of intellectual property, environmental and sustainability issues; and (iv) promoting safe learning and working environment.

Semester-I

Sl. No		PHS 101.1	PHS 101.2	PHS 102.1	PHS 102.2	PHS 103.1	PHS 103.2	PHS 104.1	PHS 104.2	PHS 195	PHS 196
1	Fundamental understanding of the field	X	X	X	X	X	X	X	X	X	X
2	Application of basic Physics concepts	X	X	X	X	X	X	X	X	X	X
3	Linkages with related disciplines	X	X	X	X	X	X	X	X	X	X

Sl. No										
4	Procedural knowledge for professional subjects	X	X	X	X	X	X	X	X	X	X
5	Skills in related field of specialization	X	X	X	X	X	X	X	X	X	X
6	Ability to use in Physics problem	X	X	X	X	X	X	X	X	X	X
7	Skills in Mathematical modelling	X	X	X	X	X	X	X	X	_	_
8	Skills in performing analysis and interpretation of data	X	X	X	X	X	X	X	X	X	X
9	Develop investigative Skills	X	X	X	X	X	X	X	X	_	X
10	Skills in problem solving in Physics and related discipline	X	X	X	X	X	X	X	X	X	X
11	Develop Technical Communication skills	X	X	X	X	X	X	X	X	X	X
12	Developing analytical skills and popular communication	X	X	X	X	X	X	X	X	X	_
13	Developing ICT skills X	X	X	X	X	X	X	X	X	_	X
14	Demonstrate Professional behaviour with respect to attribute like objectivity, ethical values, self reading, etc	X	X	X	X	X	X	X	X	X	X

Semester-II

Sl. No		PHS 201.1	PHS 201.2	PHS 202.1	PHS 202.2	PHS 203.1	PHS 203.2	PHS 204	PHS 295	PHS 296
1	Fundamental understanding of the field	X	X	X	X	X	X	X	X	X
2	Application of basic Physics concepts	X	X	X	X	X	X	X	X	X
3	Linkages with related disciplines	X	X	X	X	X	X	X	X	X
4	Procedural knowledge for professional subjects	X	X	X	X	X	X	X	X	X
5	Skills in related field of specialization	X	X	X	X	X	X	X	X	X
6	Ability to use in Physics problem	X	X	X	X	X	X	X	X	X
7	Skills in Mathematical modelling	X	X	X	X	X	X	X	_	_
8	Skills in performing analysis and interpretation of data	X	X	X	X	X	X	X	X	X
9	Develop investigative Skills	X	X	X	X	X	X	X	_	X
10	Skills in problem solving in Physics and related discipline	X	X	X	X	X	X	X	X	X
11	Develop Technical Communication skills	X	X	X	X	X	X	X	X	X
12	Developing analytical skills and	X	X	X	X	X	X	X	X	X

Sl. No									
	popular communication								
13	Developing ICT skills X	X	X	X	X	X	X	X	_	X
14	Demonstrate Professional behaviour with respect to attribute like objectivity, ethical values, self reading, etc	X	X	X	X	X	X	X	X	X

Semester-III

Sl. No		PHS 301.1	PHS 301.2	PHS 302.1	PHS 302.2	PHS 303 A	PHS 303 B.1	PHS 303 B.2	PHS 303 C	PHS 304	PHS 395	PHS 396 A	PHS 396 B
1	Fundamental understanding of the field	X	X	X	X	X	X	X	X	X	X	X	X
2	Application of basic Physics concepts	X	X	X	X	X	X	X	X	X	X	X	X
3	Linkages with related disciplines	X	X	X	X	X	X	X	X	X	X	X	X
4	Procedural knowledge for professional subjects	X	X	X	X	X	X	X	X	X	X	X	X
5	Skills in related field of specialization	X	X	X	X	X	X	X	X	X	X	X	X
6	Ability to use in Physics problem	X	X	X	X	X	X	X	X	X	X	X	X
7	Skills in Mathematical modelling	X	X	X	X	X	X	X	X	X	_	_	_
8	Skills in performing analysis and interpretation of data	X	X	X	X	X	X	X	X	X	X	X	X
9	Develop investigative Skills	X	X	X	X	X	X	X	X	X	X	X	X
10	Skills in problem solving in Physics and related discipline	X	X	X	X	X	X	X	X	X	X	X	X
11	Develop Technical Communication skills	X	X	X	X	X	X	X	X	X	X	X	X
12	Developing analytical skills and popular communication	X	X	X	X	X	X	X	X	X	X	x	x
13	Developing ICT skills X	X	X	X	X	X	X	X	X	X	_	X	X
14	Demonstrate Professional behaviour with respect to attribute like objectivity, ethical values, self	X	X	X	X	X	X	X	X	X	X	X	X

	reading, etc														

Semester-IV

Sl. No		PHS 401. 1	PHS 401. 2	PHS 402. 1	PHS 402. 2	PHS 403. 1	PHS 403. 2	PHS 404 A	PHS 404 B.1	PHS 404 B.2	PHS 404 C	PHS 495 A	PHS 495 B	PHS 495 C	PHS 496
1	Fundamental understanding of the field	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2	Application of basic Physics concepts	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3	Linkages with related disciplines	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4	Procedural knowledge for professional subjects	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	Skills in related field of specialization	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	Ability to use in Physics problem	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7	Skills in Mathematical modelling	X	X	X	X	X	X	_	X	X	X	_	_	_	_
8	Skills in performing analysis and interpretation of data	X	X	X	X	X	X	X	X	X	X	X	X	X	X
9	Develop investigative Skills	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10	Skills in problem solving in Physics and related discipline	X	X	X	X	X	X	X	X	X	X	X	X	X	X
11	Develop Technical Communication skills	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12	Developing analytical skills and popular communication	X	X	X	X	X	X	X	X	X	X	X	X	X	X
13	Developing ICT skills X	X	X	X	X	X	X	X	X	X	X	_	_	_	X
14	Demonstrate Professional behaviour with respect to attribute like objectivity, ethical values, self	X	X	X	X	X	X	X	X	X	X	X	X	X	X

		reading, etc													