GOVERNMENT ARTS AND SCIENCE FOR WOMEN-BARGUR

DEPRTMENT OF PHYSICS

2.6.1 UG SYLLABUS 2023-24 PROGRAMME OUTCOMES AND COURSE OUTCOMES

PERIYAR UNIVERSITY

PERIYAR PALKALAI NAGAR

SALEM – 636011

DEGREE OF BACHELOR OF SCIENCE

CHOICE BASED CREDIT SYSTEM

Syllabus for

B.Sc., PHYSICS

(SEMESTER PATTERN)

(For Candidates admitted in the College affiliated to Periyar University from 2023-2024 onwards)

B.Sc - PHYSICS SYLLABUS

PROGRAMME OBJECTIVES

Mentor the young students to face global challenges with unique proficiency in Physics.

To apply basic Physics principles in everyday life.

Promote analytical thinking and experimental skills in Physics.

PROGRAMME OUTCOMES

Acquire academic excellence with an aptitude for higher studies and research.

Apply appropriate scientific methods and modern technology to solve complex problems related to society.

LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK GUIDELINES BASED REGULATIONS FOR UNDER GRADUATE PROGRAMME	
Programme:	**B.Sc. PHYSICS**
Programme Code:	**08**
Duration:	**3 years [UG]**
Programme Outcomes:	**PO1:** Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study **PO2:** Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one‟s views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups. **PO3:** Critical thinking: Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development. **PO4:** Problem solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one‟s learning to real life situations. **PO5:** Analytical reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints. **PO6:** Research-related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation **PO7:** Cooperation/Team work: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.

	PO8: Scientific reasoning: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective. **PO9:** Reflective thinking: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society. **PO10:**Information/digital literacy: Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data. **PO 11:**Self-directed learning: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion. **PO 12:**Multicultural competence: Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups. **PO 13:**Moral and ethical awareness/reasoning: Ability to embrace moral/ethical values in conducting one‟s life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one‟s work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work. **PO 14:**Leadership readiness/qualities: Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way. **PO15:** Lifelong learning: Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.

Programme Specific Outcomes: **(These are mere guidelines. Faculty can create POs based on their curriculum or adopt from UGC or University for their Programme)**	**PSO1: Placement:** To prepare the students who will demonstrate respectful engagement with others‟ ideas, behaviors, and beliefs and apply diverse frames of reference to decisions and actions. **PSO 2: Entrepreneur:** To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate start-ups and high potential organizations **PSO3: Research and Development:** Design and implement HR systems and practices grounded in researches that comply with employment laws, leading the organization towards growth and development. **PSO4: Contribution to Business World:** To produce employable, ethical and innovative professionals to sustain in the dynamic business world. **PSO 5: Contribution to the Society:** To contribute to the development of the society by collaborating with stakeholders for mutual benefit.

	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
PSO 1	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
PSO 2	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
PSO3	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
PSO 4	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
PSO 5	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**

3 – Strong, 2- Medium, 1- Low

COURSE	**FIRST SEMESTER - FOUNDATION COURSE**
COURSE TITLE	**INTRODUCTORY PHYSICS**
CREDITS	**2**
COURSE OBJECTIVES	To help students get an overview of Physics before learning their core courses. To serve as a bridge between the school curriculum and the degree programme.

COURSE OUTCOMES:

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

COURSE OUTCOMES

CO1 Apply concept of vectors to understand concepts of Physics and solve problems

CO2 Appreciate different forces present in Nature while learning about phenomena related to these different forces.

CO3 Quantify energy in different process and relate momentum, velocity and energy

CO4 Differentiate different types of motions they would encounter in various courses and understand their basis

CO5 Relate various properties of matter with their behaviour and connect them with different physical parameters involved.

MAPPINGWITHPROGRAMOUTCOMES

Map course outcomes (CO)for each course with program outcomes (PO)in the3-point scale of STRONG(S), MEDIUM(M) and LOW(L).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M		

COURSE	**FIRST SEMESTER – CORE COURSE – I**
COURSE TITLE	**PROPERTIES OF MATTER AND SOUND**
CREDITS	**5**
COURSE OBJECTIVES	Study of the properties of matter leads to information which is of practical value to both the physicist and the engineers. It gives us information about the internal forces which act between the constituent parts of the substance. Students who undergo this course are successfully bound to get a better insight and understanding of the subject.

COURSE OUTCOMES	**CO1**	Relate elastic behavior in terms of three moduli of elasticity and working of torsion pendulum.
	CO2	Able to appreciate concept of bending of beams and analyze the expression, quantify and understand nature of materials.
	CO3	Explain the surface tension and viscosity of fluid and support the interesting phenomena associated with liquid surface, soap films provide an analogue solution to many engineering problems.
	CO4	Analyze simple harmonic motions mathematically and apply them. Understand the concept of resonance and use it to evaluate the frequency of vibration. Set up experiment to evaluate frequency of ac mains
	CO5	Understand the concept of acoustics, importance of constructing buildings with good acoustics. Able to apply their knowledge of ultrasonics in real life, especially in medical field and assimilate different methods of production of ultrasonic waves

COURSE OUTCOMES:

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

MAPPING WITH PROGRAM OUT COMES:

Map course outcomes (CO) for each course with program outcomes (PO) inthe3- point scale of STRONG(S), MEDIUM(M) and LOW(L).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	M	M	S	M	M	S	M	S
CO2	M	S	S	S	M	M	S	M	S	S
CO3	S	M	S	M	S	S	M	S	S	S
CO4	S	S	S	S	S	M	S	M	M	M
CO5	M	M	S	S	M	S	S	S	S	M

COURSE	**FIRST SEMESTER – CORE COURSE PRACTICALS – I**
COURSETITLE	**PROPERTIES OF MATTER EXPERIMENTS**
CREDITS	**3**
COURSE OBJECTIVES	Apply various physics concepts to understand Properties of Matter, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Acquires knowledge on how to distinguish between temperatureand heat. Introduce him/her to the field of thermometry and explain practical measurements of high temperature as well as low temperature physics. Student identifies the relationship between heat capacity, specific heat capacity. The study of Lowtemperature Physics sets the basis for the students to understand cryogenics, superconductivity, superfluidity and CondensedMatter Physics
	CO2	Derive the efficiency of Carnot‟s engine. Discuss the implications of the laws of Thermodynamics in diesel and petrolengines
	CO3	Able to analyze performance of thermodynamic systems viz efficiency by problems. Gets an insight into thermodynamic properties like enthalpy, entropy
	CO4	Study the process of thermal conductivity and apply it to goodand bad conductors. Quantify different parameters related to heat, relate them with various physical parameters and analyse them
	CO5	Interpret classical statistics concepts such as phase space, ensemble, Maxwell-Boltzmann distribution law. Develop thestatistical interpretation of Bose-Einstein and Fermi-Dirac . Apply to quantum particles such as photon and electron

MAPPING WITH PROGRAM OUT COMES:

Map course outcomes**(CO)**for each course with program outcomes**(PO)**inthe3- point scale of STRONG(**S**),MEDIUM(**M**) and LOW(**L**).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	S	M	S	S	S	M	M	S	M

COURSE	**SECOND SEMESTER – CORE COURSE PRATICALS – II**
COURSETITLE	**HEAT, OSCILLATIONS, WAVES & SOUNDEXPERIMENTS**
CREDITS	3
COURSE OBJECTIVES	Apply their knowledge gained about the concept of heat and sound waves, resonance, calculate frequency of ac mains set up experimentation to verify theories, quantify and analyse, able to doerror analysis and correlate results

COURSE	**THIRD SEMESTER – CORE COURSE – III**
COURSETITLE	**GENERAL MECHANICS AND CLASSICAL MECHANICS**
CREDITS	**4**

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	S	S	S	M	S	S
CO2	S	S	S	M	S	M	S	S	S	M
CO3	S	S	S	S	S	S	M	S	M	S
CO4	M	S	S	S	M	S	S	M	S	S
CO5	S	S	M	S	S	M	S	S	S	M

COURSE OBJECTIVES	This course allows the students: To have a basic understanding of the laws and principles of mechanics; To apply the concepts of forces existing in the system; To understand the forces of physics in everydaylife; To visualize conservation laws; To apply Lagrangian equation to solve complex problems.

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Understand the Newton‟s Law of motion, understand general theory of relativity, Kepler‟s laws and Realize the basic principles behind planetary motion
	CO2	Acquire the knowledge on the conservation laws
	CO3	Apply conservation law and calculate energy of various systems, understand and differentiate conservative and non-conservative forces
	CO4	Gain knowledge on rigid body dynamics and solve problems based on this concept
	CO5	Appreciate Lagrangian system of mechanics, apply D‟ Alemberts principle

MAPPING WITH PROGRAM OUT COMES:

Map course outcomes(CO)for each course with program outcomes(PO) inthe3- point scale of STRONG(S), MEDIUM(M) and LOW(L).

COURSE	**THIRD SEMESTER – CORE COURSE PRACTICAL-III**
COURSETITLE	**ELECTRICITY EXPERIMENTS**
CREDITS	3
COURSE OBJECTIVES	Construct circuits to learn about the concept of electricity, current, resistance in the path of current, different parameters that affect a circuit. Set up experiments, observe, analyse and assimilate the concept

COURSE	**FOURTH SEMESTER – CORE COURSE-IV**
COURSETITLE	**OPTICS AND SPECTROSCOPY**
CREDITS	**4**
COURSE OBJECTIVES	To provide an in-depth understanding of the basics of various phenomena in geometrical and wave optics; To explain the behaviour of light in different mediums; To understand the differences in the important phenomena namely interference, diffraction and Polarization and apply the knowledge in day to day life; To understand the design of optical systems and methods to minims aberrations; To solve problems in optics by selecting the appropriate equations and performing numerical or analytical calculations.

WEBLINKS	1. https://science.nasa.gov/ems/ 2. https://www.youtube.com/watch?v=tL3rNc1G0qQ&list=RDCMUCz_wo7UlGkb-8Pr6svxWo-LA&start_radio=1&t=2472 3. https://science.nasa.gov/ems/ 4. https://www.youtube.com/watch?v=tL3rNc1G0qQ&list=RDCMUCz_wo7UlGkb-8Pr6svxWo-LA&start_radio=1&t=2472 5. https://imagine.gsfc.nasa.gov/educators/gammaraybursts/imagine/index.html 6. http://www.thephysicsmill.com/2014/03/23/sky-blue-lord-rayleigh-sir-raman-scattering/ 7. http://www.thephysicsmill.com/2014/03/23/sky-blue-lord-rayleigh-sir-raman-scattering/

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Outline basic knowledge of methods of rectifying different defects in lenses, articulate technological applications of eyepieces
	CO2	Discuss the principle of superposition of wave, use these ideas to understand the wave nature of light through working of interferometer
	CO3	Extend the knowledge about nature of light through diffraction techniques; apply mathematical principles to analyse the optical instruments
	CO4	Interpret basic formulation of polarization and gain knowledge about polarimeter, appraise its usage in industries
	CO5	Relate the principles of optics to various fields of IR, Raman and UV spectroscopy and understand their instrumentation and application in industries

MAPPING WITH PROGRAM OUT COMES:

Map course out comes**(CO)**for each course with program outcomes**(PO)** in the3-pointscale of STRONG(**S**), MEDIUM(**M**) and LOW(**L**).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	M	S	M	M	M	S	S	M	M
CO2	M	S	M	S	M	S	M	M	S	S
CO3	S	M	S	S	S	M	S	S	M	M
CO4	S	M	S	M	M	S	M	M	S	M
CO5	S	M	S	M	S	S	M	S	S	S

COURSE	**FOURTH SEMESTER – CORE COURSE PRACTICALS – IV**
COURSETITLE	**LIGHTEXPERIMENTS**
CREDITS	3
COURSE OBJECTIVES	Demonstrate various optical phenomena principles, working, applywith various materials and interpret the results.

COURSE	**FIFTH SEMESTER – CORE COURSE – V**
COURSETITLE	**ATOMIC PHYSICS AND LASERS**
CREDITS	**5**

COURSE OBJECTIVES	To study about electric charges, their properties through experiments; To gain knowledge on photoelectric effect; To solve problems based on Einstein‟s photoelectric equation; To make students understand the development of atom models, quantum numbers, coupling schemes and analysis of magnetic moments of an electrons; To gain knowledge on excitation and ionization potentials, splitting of spectral lines in magnetic and electric fields; To understand the principle, production and applications of lasers.

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	**List** the properties of electrons and positive rays, **define** specific charge of positive rays, **know** different mass spectrographs.
	CO2	**Outline** photoelectric effect and the terms related to it, **State** laws of photoelectric emission, Explain experiments and applications of photo electric effect, Solve problems based on photoelectric equation.
	CO3	**Explain different atom models,** Describe **different quantum numbers and different coupling schemes.**
	CO4	**Differentiate between** excitation and ionization potentials, **Explain** Davis and Goucher‟s experiment, **Apply** selection rule, **Analyse** Paschen-Back effect, **Compare** Zeeman and Stark effect.
	CO5	**Understand the condition for production of laser, Appreciate various** properties and applications of lasers.

MAPPING WITH PROGRAM OUT COMES:

Map course out comes**(CO)** for each course with program outcomes**(PO)** inthe3-pointscale of STRONG(**S**), MEDIUM(**M**) and LOW(**L**).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	S	S	S	M	S	M
CO2	S	S	M	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	M	S	S	S
CO4	M	S	S	S	S	M	S	M	M	M
CO5	S	M	S	S	M	S	S	M	M	S

COURSE	**FIFTH SEMESTER – CORE COURSE- VI**
COURSETITLE	**RELATIVITY AND QUANTUM MECHANICS**
CREDITS	**4**
COURSE OBJECTIVES	To understand the theory of relativity, its postulates and the consequences. To learn the importance of transformation equations and also to differentiate between special and general theory of relativity. To interpret the wave theory of matter with various theoretical and experimental evidences. To derive and use Schrodinger‟s wave equation and also learn about various operators. To solve Schrodinger‟s wave equation for simple problems and analyse to understand the solutions.

WEBLINKS	1. http://hyperphysics.phy-astr.gsu.edu/hbase/qapp.html 2. https://swayam.gov.in/nd2_arp19_ap83/preview 3. https://swayam.gov.in/nd1_noc20_ph05/preview 4. https://www.khanacademy.org/science/physics/special-relativity/minkowski-spacetime/v/introduction-to-special- relativity-and-minkowski-spacetime-diagrams

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Understand various postulates of special theory of relativity.
	CO2	**Appreciate the importance of transformation equations and also the general theory of relativity..**
	CO3	Realise the wave nature of matter and understand its importance
	CO4	Derive Schrodinger equation and also realize the use of operators.
	CO5	Apply Schrödinger equation to simple problems.

MAPPING WITH PROGRAM OUT COMES:

Map course outcomes**(CO)** for each course with program outcomes**(PO)** inthe3- point scale of STRONG(**S**),MEDIUM(**M**)andLOW(**L**).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	S	S	S	M	S	M
CO2	S	S	M	S	M	M	S	M	M	M
CO3	M	M	S	M	S	S	M	S	S	S
CO4	M	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	M	M	S	M	M	S

COURSE	**FIFTH SEMESTER – CORE COURSE – VII**
COURSETITLE	**ELECTRICITY AND MAGNETISM**
CREDITS	**4**
COURSE OBJECTIVES	To acquire in-depth knowledge of measuring instruments involving electric and magnetic fields.To study various magnetic properties of materials and their applications. To give an idea of the fundamentals of electromagnetic induction and alternating currents.On the successful completion of the course, students will be able to recognize basic principles and applications of electrometers.Effectively formulate the electrical circuit problem into a mathematical problem using circuits, laws and theorems.

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Define And Derive The Laws Of Electricity And Magnetism
	CO2	Update The Knowledge Of Properties And Magnetism
	CO3	Expertise The Skills To Manufacture Devices
	CO4	Understand The Properties Of Electric And Magnetic Materials
	CO5	Acquire Experimental Skills To Construct Technically Useful Devices.

MAPPING WITH PROGRAM OUT COMES:

Map course outcomes**(CO)**for each course with program outcomes**(PO)** inthe3- point scale of STRONG(**S**),MEDIUM(**M**) andLOW(**L**).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	M	S	M	M	S	S	M	M	S
CO2	S	M	M	M	S	M	M	S	S	M
CO3	S	S	S	S	S	S	S	S	S	S

COURSE	**FIFTH SEMESTER – CORE COURSE PRACTICALS –V**
COURSETITLE	**GENERAL EXPERIMENTS**
CREDITS	**3**
COURSE OBJECTIVES	Demonstrate various optical phenomena principles, working, apply with various materials and interpret the results.

COURSE	**SIXTH SEMESTER – CORE COURSE-VIII**
COURSETITLE	**NUCLEAR AND PARTICLE PHYSICS**
CREDITS	**3**
COURSE OBJECTIVES	To understand constituents, properties and models of nucleus.To give reason for radioactivity and study their properties.To learn about the principles of various particle detectors and accelerators. To acquire knowledge on different types of nuclear reactions and their applications.To know the reason for cosmic rays and their effect on the surface of earth and also understand the classification of elementary particles.

WEBLINKS	1. http://hyperphysics.phy-astr.gsu.edu/hbase/nuccon.html 2. https://www.kent.edu/physics/nuclear-physics-links 3. https://www2.lbl.gov/abc/links.html

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Describe various models that explain about the nuclear structures
	CO2	Give reason for various kinds of radioactivity and also know laws governing them
	CO3	Know the principles and applications of various particle detectors and accelerators.
	CO4	Discuss the concepts used in nuclear reaction.
	CO5	Classify various elementary particles and study the effect of cosmic rays.

MAPPING WITH PROGRAM OUT COMES:

Map course outcomes**(CO)** for each course with program outcomes**(PO)** inthe3-pointscale of STRONG(**S**),MEDIUM(**M**) andLOW(**L**).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**

CO1	S	M	S	S	S	S	S	M	S	S
CO2	S	S	M	S	M	M	S	M	M	M
CO3	M	M	S	M	S	M	M	S	S	S
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	M	M	S	M	M	S

COURSE	**SIXTH SEMESTER – CORE COURSE-IX**
COURSETITLE	**SOLID STATE PHYSICS**
CREDITS	**3**
COURSE OBJECTIVES	To understand constituents, properties and models of nucleus. To give reason for radioactivity and study their properties.To learn about the principles of various particle detectors and accelerators. To acquire knowledge on different types of nuclear reactions and their applications. To know the reason for cosmic rays and their effect on the surface of earth and also understand the classification of elementary particles.

WEBLINKS	1. https://nptel.ac.in/courses/115105099/ 2. https://nptel.ac.in/courses/115106061/

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

COURSE OUTCOMES	**CO1**	Classify the bonding &crystal structure also learn about the crystal structure analysis using X ray diffraction.
	CO2	Understand the lattice dynamics and thus learn the electrical and thermal properties of materials.
	CO3	Give reason for classifying magnetic material on the basis of their behaviour.
	CO4	Comprehend the dielectric behavior of materials.
	CO5	Appreciate the ferroelectric and super conducting properties of materials.

MAPPING WITH PROGRAM OUT COMES:

Map course outcomes **(CO)**for each course with program outcomes **(PO)**in the 3-point scale of STRONG(**S**), MEDIUM(**M**) and LOW(**L**).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	M	S	S	S	S	S	M	S	S
CO2	M	S	M	S	M	M	S	M	M	M
CO3	S	M	S	M	S	M	M	S	S	S
CO4	S	S	S	S	M	S	S	M	M	M
CO5	S	M	M	S	S	M	S	M	M	S

COURSE	**SIXTH SEMESTER – CORE COURSE – X**
COURSETITLE	**DIGITAL ELECTRONICS AND MICROPROCESSOR 8085**
CREDITS	**3**
COURSE OBJECTIVES	To learn all types of number systems, Boolean algebra and identities, digital circuits for addition and subtraction, flip-flops, registers, counters. To get the knowledge on fundamentals of 8085 architecture, instruction sets and simple programs.

COURSE	**SIXTH SEMESTER – CORE COURSE PRACTICALS – VI**
COURSETITLE	**ELECTRONICS EXPERIMENTS**
CREDITS	**3**
COURSE OBJECTIVES	To perform basic experiments on characteristics of electronic devices and then get into the applications such as amplifiers, oscillators, counters, multivibrators. Perform fundamental experiments on microprocessor 8085 and learn to write programs by themselves.

DISCIPLINE SPECIFIC CORE ELECTIVES

COURSE	**FIFTH SEMESTER –ELECTIVE – I**
COURSETITLE	**ENERGY PHYSICS**
CREDITS	3
COURSE OBJECTIVES	To get the understanding of the conventional and non-conventional energy sources, their conservation and storage systems.

COURSE	**FIFTH SEMESTER –ELECTIVE – II**
COURSETITLE	**MATERIALS SCIENCE**
CREDITS	**3**
COURSE OBJECTIVES	To learn imperfections in crystals, deformation of materials and testing of materials. To get knowledge on behavior of a material, under the action of light and their applications. To know the applications of crystal defects.

COURSE	**SIXTH SEMESTER –ELECTIVE – III**
COURSETITLE	**NANOSCIENCE AND NANO TECHNOLOGY**
CREDITS	**3**
COURSE OBJECTIVES	This course aims to provide an overall understanding of Nanoscience and Nanotechnology and introduces different types of nanomaterials,their properties, fabrication methods, characterization techniques and a range of applications.

REFERENCE BOOKS	1. Richard Booker and Earl Boysen, (2005) Nanotechnology,WileyPublishingInc. USA 2. J.H.Fendler (2007) Nanoparticles and nano structured films;Preparation, Characterization andApplications, JohnWiley&Sons 3. B.S.Murty, et al(2012) Textbook of Nanoscience and Nanotechnology, Universities Pr

SKILL ENHANCEMENT COURSES

COURSE	**SKILL ENHANCEMENT COURSE-3**
COURSETITLE	**INSTRUMENTATION**
CREDITS	2
COURSE OBJECTIVES	To study the instrument with its principle and observe themethod of their functioning. To provide a good foundation in measurements. To inspire interest in the knowledge of concepts regarding measurements.

WEBLINKS	1.https://www.electronicshub.org/ir-sensor/ 2.https://www.electronicsforu.com/technology-trends/learn- electronics/ir-led-infrared-sensor-basics

COURSE	**SKILL ENHANCEMENT COURSE-5**
COURSETITLE	**COMPUTATIONALMETHODSANDPROGRAMMINGIN–C**
CREDITS	2
COURSE OBJECTIVES	This course will provide the necessary basic concepts of errors in computing and a few numerical methods for finding zeros of non-linear functions. Further, will provide the basics of the C programming language.

COURSE	**SKILL ENHANCEMENT COURSE-6**
COURSETITLE	**ELECTRONIC DEVICES**
CREDITS	2
COURSE OBJECTIVES	Providing an overview of the principles, operation and applications of special diodes. Introducing transistor and transistor biasing. Providing an overview of the principles, operation and applications of special devices. Providing an overview of amplifiers, oscillators and their applications in different electronic fields. To make students acquire knowledge about Boolean algebra, logic circuits, designing counters and the basic concepts of memory and programmable logic device.

COURSE	**SKILL ENHANCEMENT COURSE-7**
COURSETITLE	**COMMUNICATION SYSTEM**
CREDITS	2
COURSE OBJECTIVES	To enable the students to understand the different types of communications and make them appreciate the flavour of physics in communication.

COURSE	**SKILL ENHANCEMENT COURSE - ENTREPRENEURIAL BASED**
COURSETITLE	**DIGITAL PHOTOGRAPHY**
CREDITS	2
COURSE OBJECTIVES	To understand the principles of photography and image formation and the science and arts behind it. To understand the essential componentsof conventional and digital camera and also the different image processing techniques.

REFERENCE BOOKS	3. Mark Galer, Digital Photography in Available Lightessential skills, 2006, Focal press, London 4. Paul Harcourt Davies, The Photographer‟s practical handbook,2005, UKPRESS

COURSE	**SKILL ENHANCEMENT COURSE-ENTREPRENEURIAL BASED**
COURSE TITLE	**HOME ELECTRICAL INSTALLATION**
CREDITS	2

COURSE	**SKILL ENHANCEMENT COURSE-NON-MAJOR ELECTIVES(NME)**
COURSETITLE	**PHYSICS FOR EVERYDAY LIFE**
CREDITS	2
COURSE OBJECTIVES	To know where all physics principles have been put to use in daily lifeand appreciate the concepts with a better understanding also to know about Indian scientists who have made significant contributions to Physics.
COURSE OBJECTIVES	The students will get knowledge on electrical instruments, installationsand domestic wiring techniques with safety precautions and servicing.

COURSE	**SIXTH SEMESTR – PROFESSIONAL COMPETENCY SKILLS**
COURSETITLE	**QUANTITATIVE APTITUDE FOR COMPETITIVE EXAMINATIONS**
CREDITS	2
COURSE OBJECTIVES	To motivate undergraduate students of physics to develop their aptitude and reasoning skill for competitive examinations.

COURSE	**SKILL ENHANCEMENT COURSE-NON-MAJOR ELECTIVES (NME)**
COURSE TITLE	**ASTROPHYSICS**
CREDITS	2
COURSE OBJECTIVES	This course intends tointroduce principles of astrophysics describing the science of formation and evolution of stars and interpretation of various heavenly phenomena and provide an understanding of the physical nature of celestialbodies along with the instrumentation and techniques used in astronomical research

WEBLINKS	1. https://youtu.be/M_5KYncYNyc 2. https://youtu.be/ljJLJgIvaHY 3. https://youtu.be/7mGqd9HQ_AU 4. https://youtu.be/h5jOAw57OXM 5. https://learningtechnologyofficial.com/category/fluid - mechanics-lab/ 6. http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.htmlhttps://www.youtube.com/watch?v=gT8Nth9NWPMhttps://www.youtube.com/watch?v=9mXOMzUruMQ&t=1shttps://www.youtube.com/watch?v=m4u-SuaSu1s&t=3shttps://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work

COURSE	**ALLIED PAPER**
COURSETITLE	**ALLIED PHYSICS – I**
CREDITS	4
COURSE OBJECTIVES	To impart basicprinciplesof Physics that which would be helpful for students who have taken programmes other than Physics.

COURSE OUTCOMES	**CO1**	Explain types of motion and extend their knowledge in the study of various dynamic motions analyze and demonstrate mathematically. Relate theory with practical applications in medical field.
	CO2	Explain their knowledge of understanding about materials and their behaviors and apply it to various situations in laboratory and real life. Connect droplet theory with Corona transmission.
	CO3	Comprehend basic concept of thermodynamics concept of entropy and associated theorems able to interpret the process of flow temperature physics in the background of growth of this technology.
	CO4	Articulate the knowledge about electric current resistance, capacitance in terms of potential electric field and electric correlatetheconnectionbetweenelectricfieldandmagneticfieldandanalyzethemmathematicallyverifycircuitsandapplytheconcepts to construct circuits and study them.
	CO5	Interpret the real life solutions using AND, OR, NOT basic logic gates and in tend their ideas to universal building blocks. InferoperationsusingBooleanalgebraandacquireelementaryideasofICcircuits.Acquire information about various Govt. programs/ institutions in this field.

COURSE OUTCOMES:

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

MAPPING WITH PROGRAM OUT COMES:

Map course outcomes**(CO)**for each course with program outcomes**(PO)**inthe3-pointscale of STRONG(**S**),MEDIUM(**M**)andLOW(**L**).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	M	S	S	S	M	S	S	S	S	M
CO3	M	S	S	S	S	M	S	S	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	M	S	S	S	S	S	S	S	S	S

COURSE	**ODD SEMESTER – CORE**
COURSETITLE	**ALLIED PRACTICALS – I**
CREDITS	2
COURSE OBJECTIVES	Apply various physics concepts to understand Properties of Matter and waves, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results

COURSE	**ALLIED PAPER**
COURSETITLE	**ALLIED PHYSICS –II**
CREDITS	4
COURSE OBJECTIVES	To understand the basic concepts of optics, modern Physics, concepts of Relativity and Quantum Physics, semiconductor Physics, and Electronics.

COURSE OUTCOMES:

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

COURSE OUTCOMES	**CO1**	Explain the concepts of interference diffraction using principles of superposition of waves and rephrase the concept of polarization based on wave patterns
	CO2	Outline the basic foundation of different atom models and various experiments establishing quantum concepts. Relate the importance ofinterpretingimprovingtheoreticalmodelsbasedonobservation .Appreciateinterdisciplinarynatureofscience and in solar energy related applications.
	CO3	Summarizethepropertiesofnuclei, nuclearforcesstructureofatomicnucleusandnuclear models. Solveproblems on delayratehalf-lifeand mean-life.Interpret nuclear processes likefission and fusion. Understand the importance of nuclear energy, safety measures carried and get our Govt.agencies like DAE guiding the country in the nuclear field.
	CO4	Todescribethebasicconceptsofrelativitylikeequivalenceprincip le, inertialframes and Lorentz transformation. Extend their knowledge on concepts ofrelativityandviceversa. Relate this with current research in this field and get an overview of research projects of National and International importance, like LIGO, ICTS, and opportunities available.
	CO5	Summarize the working of semiconductor devices like junction diode, Zenerdiode, transistors and practical devices we daily use like USB chargers and EV charging stations.

MAPPING WITH PROGRAM OUT COMES:

Map course outcomes(CO)for each course with program outcomes(PO)inthe3- point scale of

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	M	S	S	S	M	S	S	S	S	M
CO3	M	S	S	S	S	M	S	S	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	M	S	S	S	S	S	S	S	S	S

STRONG(S),MEDIUM(M) and LOW(L).

COURSE	**EVEN SEMESTER – CORE**
COURSETITLE	**ALLIED PRACTICALS – II**
CREDITS	2
COURSE OBJECTIVES	Apply various Physics concepts to understand concepts of Light, electricity and magnetism and waves, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results

GOVERNMENR ARTS AND SCIENCE COLLEGE FOR WOMEN-BARGUR

DEPARTMENT OF PHYSICS

2.6.1 PROGRAMME OUTCOMES AND COURSE OUTCOMES 2023-24 SYLLABUS REPORT

PERIYAR UNIVERSITY PERIYAR PALKALAI NAGAR

SALEM – 636011

DEGREE OF MASTER OF SCIENCECHOICE BASED CREDIT SYSTEM (CBCS)

M.Sc. PHYSICS

SYLLABUS

For Candidates admitted in the Colleges affiliated to Periyar University from the Academic Year 2023-2024 onwards.

M.Sc. PHYSICS REGULATIONS

1. PROGRAMME OBJECTIVES AND OUTCOMES

PROGRAMME OBJECTIVES (POs)

PO1: The main aim of the M.Sc (Physics) programme is to have enriched syllabus prepared based on the recent scientific developments in physics and its interdisciplinary areas and to meet out the requirements of today's academic, research and industry requirements.

PO2: To impart comprehensive knowledge in theoretical, experimental and computational physics and a better understanding of the subject.

PO3: To teach core subjects of physics to students to acquire knowledge and to have in depth understanding about the laws of physics, concepts, principles and solve analytical problems.

PO4: To enrich knowledge through problem-solving skills, projects, seminars, participation in scientific events and study visits.

PO5: To prepare for careers in Teaching, Research laboratories and public/private sector units and to implant the entrepreneurship character.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

On the successful completion of the M.Sc. Physics Programme, the students will

PSO1: Have a deep knowledge of the fundamental concepts of Physics and understand how the various phenomena in nature follow the laws of Physics.

PSO2: Identify, formulate and analyze the scientific problems using the basic principles.

PSO3: Develop problem-solving skills and have the ability to apply mathematical tools to understand and describe physical problems.

PSO4: Be able to handle the laboratory equipments, gain knowledge about advanced experimental techniques and can successfully interpret results required for research and industrial applications.

PSO5: Acquire effective computational skills to apply them to scientific and technological problems.

PSO6: Get familiarized with contemporary research within various fields of Physics.

7. TRANSITORY PROVISION

Candidates who have undergone the Course of Study prior to the Academic Year 2023 - 2024 will be permitted to take the Examinations under those Regulations for a period of four years i.e., up to and inclusive of the Examination of April 2027 thereafter they will be permitted to take the Examination only under the Regulations in force at that time.