A.D.M. COLLEGE FOR WOMEN

(Autonomous)

Affiliated to Bharathidasan University

(Nationally Accredited with "A" Grade by NAAC – 4th Cycle)

NAGAPATTINAM 611 001.

LOCAL/NATIONAL/REGIONAL/GLOBAL RELEVANCE

PG DEPARTMENT OF PHYSICS

Programme: B.Sc Physics **Year: 2022-2023**

Course Code	Title of the Course	Local/Regional/ National /Global	Rationale	Course Outcomes	PSOs Addressed	Cognitive Level
PUA	Properties of Matter and Acoustics	Local	To understand the qualities of matter in terms of their properties and to be knowledgeable with the basics of acoustics.	• CO1: To learn how to measure elasticity by various methods	PSO3,4	U, AN
				• CO2: To demonstrate a basic understanding of bending of beams, depression and Elevation of Cantilever.	PSO3,4	U, AP
				• CO3: Define surface tension as a Physical Property and the units that are used to measure it.	PSO3,4	U, AN

				• CO4: Learn about the formula for viscosity, fluid flow and measurement of viscosity using lab experiments.	PSO3,4	U,AP
				• CO5: Experience when our ears are excited by vibration in the gas that surrounds us and production, detection and medical applications of Ultrasonic waves.	PSO1,2	U, AP
PUC	Mechanics	Local	An attempt is made to give a better insight of the change of position of any physical object or event and their consequences.	• CO1: Understand Laws of Motion and their application	PSO 2	AP
				• CO2: Learn the concept of Conservation of Energy, Momentum, Angular • Momentum and apply them to basic problems.	PSO1	U
				• CO3: Understand the analogy between	PSO2	U

				Translational and Rotational Dynamics, and application of both motions simultaneously in analyzing rolling with slipping.		
				• CO4: Develop the Energy of the Friction with the Compound Pendulum and Friction Clutch.	PSO3,4	AN
				• CO5: To understand various Dynamical Situations, Notion of Inertial Frames and Concept of Galilean Invariance.	PSO1,2	U, AP
PUD	Thermal Physics	Local	To understand the phenomena connected with heat as radiation, conduction, different thermal capacities of substances and the	• CO1: Students will demonstrate a basic understanding of the concepts and underlying principles of classical physics.	PSO2,3	U, AP

			converse process of making heat to do mechanical work.	• CO2: Students will gain an appreciation of the quantitative methods used in Physics	PSO2,3	U, AP
				• CO3: Understand the concept of thermodynamics and there laws.	PSO 2	U
				• CO4: Understand the Heat Engine and there uses.	PSO 4	AC
				• CO5: Describe the Thermodynamic function and there relations.	PSO 1	R
PUE1	Energy Physics	National	This introduction emphasis has been place on the nature an application of the energ sources. World today i	• CO1: Understand the sources of energy and their contributions to the energy and power needs of the nation and the world.	PSO 3	U

			switch over to renewabl energy. The thrust area mainly cover programmes, such as Rural Energy, Sola Energy, Energy fro Urban & Industria Wastes, Powe Generation- Wind Biomass, Small Hydro New Technologies Ocean& Geotherma Energy.	• CO2: Be able to effectively use Rank in Cycle analysis	PSO2	AP
				• CO3: Understand the differences between large quantities of fuel and waste	PSO 1	AC
				• CO4: Fully appreciate the aspect of capital cost amortization and allocation to unit of energy produced.	PSO 4	AP
				• CO5: Be able to analyze comparisons of capital cost allocation, operating cost, including fuel costs. Special attention is given to the renewables for which there is zero or negligible fuel cost.	PSO 3	AC

PUF	Electricity Magnetism and Electro magnetism	Local	To provide an in depth coverage of behaviour of stationary electric charges, electricity, magnetism and how they are connected.	• CO1: After the completion of the course, Students will be able to	PSO2	R
				• CO2: Explain various phenomenon like Ferromagnetism, ant ferromagnetism etc.	PSO3,4	U, AP
				• CO3: Understand the relation in between Electromagnetic theory.	PSO1,2	AP
				• CO4: Explain various phenomenon in light of max well equations.	PSO4	AP
				• CO5: After the completion of the course, Students will be able to	PSO2,3	AP

PUE2	Weather Forecasting	Global	To describe the utility of Physics in daily life. To facilitate development of problem solving skills.	• CO1: Students can demonstrate knowledge of the typical vertical variation of the basic variables used to quantify the atmospheric state, including temperature, pressure, humidity, winds, and natural and anthropogenic particles	PSO1	U
				• CO2: To basic techniques used by meteorologists (and other scientists) to gather and interpret atmospheric data	PSO 4	AC
				• CO3: To learn of climate and climate change, together with the possible influences that humans have on diverse climate phenomena	PSO4	AC

				• CO4: To knowledge of the typical vertical variation of the basic variables used to quantify the atmospheric state, including temperature, pressure, humidity, winds, and natural and anthropogenic particles	PSO3	AC
				• CO5: To meteorologists (and other scientists) to gather and interpret atmospheric data	PSO2	AP
PUS1	Astrophysics	Global	To develop Procedural, experimental, observational skills.	• CO1: Become familiar with nuclear particles and different particle accelerators. Student is expected to know the working of different accelerators.	PSO1	U, AP

				• CO2: Have Peripheral ideas about astronomy and astrophysics	PSO 1	AP
				• CO3: Student describes all of the major structures of the Solar System.	PSO 3	AC
				• CO4: Student can describe the history of the Solar System.	PSO 1	AC
				• CO5: Atmospheres of objects in the solar system.	PSO 5	AN
PUG	Optics	Local	To familiarize t fundamental la concerning reflecti refraction, interferen diffraction, polarizati spectrum and Opti Instruments.	• CO1: Understand t physics behind vario phenomenon's in wave and optics.	PSO 1	U
				• CO2: Understand various phenomenons and the cause or origin of them.	PSO 3	AP

				• CO3: Explain the relationship in between various optical phenomenon's with the Fourier series and matrix.	PSO3,4	U, AP
				• CO4: Understand various natural phenomenon's which is happening in their surroundings.	PSO 3	C
				• CO5: Explain the relationship in between various optical phenomenon's.	PSO 2	U, AP
PUH	Atomic and Molecular Physics	Regional	To understand the outgrowth of the structure, extra nuclear part of the atom and origin of the spectra.	• CO1: To analyse various types of spectro graphy to study about the positive rays.	PSO2,4	U
				• CO2: Explain magneto optical properties of materials.	PSO1,2	U
				• CO3: To find applications of photo electrical cells and x-rays.	PSO2,4	U,R

				• CO4: They should be able to calculate the effect of an electrical field on the energy levels of the hydrogen atom.	PSO1,2	U
				• CO5: Students learn about electronic, rotational and vibrational energy levels of diatomic molecules.	PSO 2	U
PUI	Electronics	Regional	To enable the students to understand all aspects of electronics in a lucid and comprehensive manner.	• CO1: Explain the theoretical principles essential for understanding the operation of electronic circuit	PSO 3,4	AP
				• CO2: Measure the characteristics of electronic circuit and present experiment result	PSO 3	AP

				• CO3: Analyze electrical circuit and calculate the main parameters	PSO 3	AN
				• CO4: Develop Design and create simple analogue and digital electronics circuit	PSO 3,4	AN,AP
				• CO5: Know about the multistage amplifier using BJT and FET various configuration	PSO 3,4	AP
PUE3	Microprocessor and C Programming	Regional	To familiarize the students with the new concepts and inventions in the field of information technology.	• CO1: Write programs to run on 8085 microprocessor	PSO 1,2	U
				• CO2: Understand and device techniques for faster execution of instruction, improve speed of operations.	PSO 2,4	AP

				• CO3:Understand microprocessor and its advantage.	PSO 3	AP
				• CO4:Describe the fundamental components of a C program, e.g source file, header file, main function, functions and libraries	PSO 2	U
				• CO5: Explain and apply fundamental syntax rules for identifies, declarations expressions, statements and functions.	PSO 3,4	U, AP
PUS2	Biomedical Instrumentation	Global	To equip the students with sufficient knowledge base of Physics so that they do not find any difficulty in pursuing higher education.	• CO1: Study the function of bioelectric potentials and its importance and understand the different types of waveforms generated by organs.	PSO 1	U

				• CO2: Learn the fundamental knowledge of the electrodes to sense bio potentials.	PSO 1,2	U
				• CO3: Learn the basic concepts and interpretations of ECG and BP.	PSO 1,2	U
				• CO4: Understand the anatomy of the nervous system and its signal measurements (EMG, CAT).	PSO 1	AC
				• CO5: Analyse and understand the applications of the imaging techniques transmission(x- ray and ultrasound)	PSO 2,4	U

PUS3	Statistics	Regional	To develop Procedural, experimental, observational skills.	• CO1: Organize, manage and present data.	PSO 5	U
				• CO2: Analyse statistical data using measures of central tendency dispersion and location	PSO 5	AN
				• CO3: Analyse statistical data graphically using frequency distribution and cumulative frequency distribution.	PSO 5	AN
				• CO4: Use discrete and continuous probability distributions, including mean, median, mode	PSO 5	AN
				• CO5:Identifythetypeofcharacteristicsofdifferentdiscreteandcontinuous distributions.	PSO 5	AP

PUK	Nuclear Physics	National	To emphasize the understanding of nuclear forces and models, elementary particles and Accelerators.	• CO1: Explain nuclear properties compare crop of liquid with that of a nucleus and understand shell model.	PSO 2	U
				• CO2: Distinguish between principles and working of different types of detectors, counters and accelerators.	PSO 1	AC
				• CO3: Describe basic radioactivity calculate half-live and understand radiation hazards.	PSO 2	U
				• CO4: Explain natural and artificial transmutations calculate Q-value of a reaction	PSO 2	U
				• CO5: Explain recognize the applications of isotope.	PSO 2	U

PUL	Classical and Quantum Physics	National	To know the facts and develop a unified and logical treatment of the subject matter with clarity and conciseness.	• CO1: After taking this course students will be able to appreciate the beauty of quantum mechanics. They will be knowing all types of representations of operators and ways to apply them in different problems.	PSO 1	AC
				• CO2: To equip the students with sufficient knowledge base of Physics so that they do not find any difficulty in pursuing higher education. The most important thing students learned from this course was how to solve the hydrogen atom problem	PSO 1	AC

				by using quantum mechanics.		
				• CO3: Describe and understand the motion of a mechanical system using Lagrange Hamilton formalism.	PSO 1	U
				• CO4: Describe and understand the motion of the forces in non-inertial systems	PSO 1	AC
				• CO5: Understand and to equip the students with sufficient knowledge base of Physics so that they do not find any difficulty in pursuing higher education. Explain the differences between classical and quantum mechanics.	PSO 1	**U**

PUE4	Materials Science	Regional	• To familiarize the students with the new concepts and To equip the students with sufficient knowledge base of Physics so that they do not find any difficulty in pursuing higher education. • inventions in the field of information technology.	• CO1: Upon completion of this course the student will be able to: • CO2: Identify the prop To equip the students with sufficient knowledge base of Physics so that they do not find any difficulty in pursTo equip the students with sufficient knowledge base of Physics so that they do not find any difficulty in pursuing higher education.Properties of metals with respect to crystal structure and grain size	PSO 1 PSO 1	AP AC

				• CO3: Interpret the phase diagrams of materials	PSO 1	AP
				• CO4: Classify and Distinguish different types of cast irons, steels and non-ferrous alloys.	PSO 2	U, AC
				• CO5: Describe the concept of heat treatment of steels & strengthening mechanisms	PSO 1	AP
PUE5	Communications Physics	Regional	• To equip the students with sufficient knowledge base of Physics so that they do not find any difficulty in pursuing higher education.	• CO1: Students will demonstrate an understanding of core Knowledge in physics, including the major premises of classical mechanics, E & amp; M and Modern Physics.	PSO 1	R

				• CO2: Students w demonstrate written ar oral communication skil in communicating physics related topics.	PSO 4	AP
				• CO3:Students will demonstrate understanding of the applications of numerical techniques for modeling physical systems for which analytical methods are in appropriate or of limited Utility.	PSO 5	AN
				• CO4: Students w demonstrate a thorou understanding of t analytical approach modeling of physic phenomena.	PSO 5	AP

				CO5: Students will demonstrate an understanding of the To equip the students with sufficient knowledge base of Physics so that they do not find any difficulty in pursuing higher education.impact of physics and science on society.	PSO 2	C

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LOCAL/NATIONAL/REGIONAL/GLOBAL RELEVANCE

PG DEPARTMENT OF PHYSICS

Programme: M.Sc., Physics **Year: 2022-2023**

Course Code	Title of the Course	Local/Regional/ National /Global	Rationale	Course Outcomes	PSOs Addressed	Cognitive Level
PGPA	Mathematical Physics	National	To learn various mathematical concepts and techniques in vector space, groups and functions of special types to solve physical problems.	• CO1: To learn various mathematical concepts and techniques in vector space, groups and functions of special types to solve physical problems.	PSO1	AC

				• CO2: Revise the knowledge of calculus, vectors, vector calculus, probability and probability distributions.	PSO1	AC
				• CO3: Learn the basic properties of gamma, beta function and differention. To equip the students with sufficient knowledge base of Physics so that they do not find any difficulty in pursuing higher education.	PSO3	U,AN
				• CO4: Describe the basic ideas about Cauchy's integral theorem and integral formulation	PSO3	U,R

				• CO5: Quantitative understanding of group theory, classes, co sets sub groups.	PSO3	U,AP
PGPB	Classical Dynamics and Relativity	Regional	To know what central conservative forces mathematically, understand the conservative theorems of angular momentum.	• CO1: Have a deep understanding of Newton law.	PSO1	U,R
				• CO2: Apply to variation principle to real physical problems.	PSO3	AN,AP
				• CO3: Able to frame model in mechanical systems, both in inertial and rotating frames and Hamilton equation.	PSO3	U
				• CO4: Identify the forces and torques occurring in a given problem.	PSO3	U,AP
				• CO5: To setup theequation of motion and solve the problems.	PSO4	AP

PGPC	Electronics	National	This course is familiarize the students about the transistor, operational amplifier and Digital electronics Circuit.	• CO1: Explain the theoretic principles essential for understanding the operation of electronic circuit.	PSO1	U,AP
				• CO2: Analyze electrical circuit and calculate the main parameters.	PSO1	U
				• CO3: Develop Design and create simple analogue and digital electronics circuit.	PSO4	U,AP
				• CO4: Understand the fundamentals and area of application for the integrated circuit.	PSO1	U,AP
				• CO5: Know about the multistage amplifier using BJT and FET various configuration	PSO4	AC, AP

PGPD	Methods of Spectroscopy	Global	To familiarize with the basic principles of various Spectroscopic Techniques and their applications in the determinations of atomic structure, chemical composition and Physical properties of materials	• CO1: Explain what it mean to use Spectroscopic methods for qualitative & quantitative analysis.	PSO1	U,R
				• CO2: Compare and contras of atomic and molecular spectra.	PSO1	AN
				• CO3:Explain the difference between stokes and anti-stokes line in a RamTo equip the students with sufficient knowledge base of Physics so that they do not find any difficulty in pursuing higher education.	PSO1	AC
				• CO4: Understanding of Quantum theory and NMTo equip the	PSO5	U

				students with sufficient knowledge base of Physics so that they do not find any difficulty in pursuing higher education. R spectroscopy.		
				• CO5: The probability of transition between vibration levels of two electronic states determined by Frank-Condon pr. To equip the students with sufficient knowledge base of Physics so that they do not find any difficulty in pursuing higher education.	PSO1	U

PGPF	Electromagnetic Theory	National	To learn the theory for the fields produced by stationary and moving charge and charged systems and propagation of electromagnetic fields.	• CO1: The theory of electromagnetic propagation of electromagnetic fields.	PSO1	U,R
				• CO2: Learn the boundary value problem in electrostatics methods of image charges.	PSO3	U.AN
				• CO3: Understand Maxwell equation and its physical significance.	PSO1	U
				• CO4: Learn To equip the students with sufficient knowledge base of Physics so that they do not find any difficulty in pursuing higher education. • Electromagnetic waves and wave propagation.	PSO1	U

				• CO5: Understand magneto static and magnetic dipole.	PSO1	AC
PGPG	Quantum Mechanics	Regional	To learn the fundamental concepts and certain theoretical methods of quantum mechanics and their applications to microscopic systems.	• CO1: Solves the time-independents corn dinger equation as an solve intermediate step to solve the time dependents corn dinger equation. To equip the students with sufficient knowledge base of Physics so that they do not find any difficulty in pursuing higher education.	PSO3	U
				• CO2: Identifies correctly the mathematical space that contains all possible states of a	PSO1	AN

				physical system, using Dirac ‘s equation.		
				• CO3: Build a Hilbert space based on a complete set commuting observables.	PSO1	AN,AC
				• CO4: Relativistic Quantum mechanics understanding the Klein Gordon equation for a free particle and Dirac equation for a free particle and Dirac matrices. • To equip the students with sufficient knowledge base of Physics so that they do not find any difficulty in pursuing higher education.	PSO4	AN,AC

				• CO5: Compute the energy levels and evaluation the quantum simple harmonic oscillator.	PSO1	U
PGPE1	Microprocessor and Microcontroller	Regional	To understand the basic architecture of Intel 8085 microprocessor. To practice the fundamental programming methodologies in c programming language.	• CO1: Write programs to run on 8085 microprocessor.	PSO3	AP
				• CO2: Understand and device techniques for faster execution of instruction, improve speed of operations.	PSO1	U,AP
				• CO3: Understand microprocessor and its advantage.	PSO1	U
				• CO4: Describe the fundamental components of a C program e.g source file, header file, main function , functions and libraries.	PSO4	U

				• CO5: Explain and apply fundamental syntax rules for identifies, declarations, expressions, statements To equip the students with sufficient knowledge base of Physics so that they do not find any difficulty in pursuing higher education.	PSO1	AN,AC
PGPE2	Numerical Methods and C++ Programming	National	To learn the numerical methods of computing certain mathematical quantities, construction and evaluation of a function and solution of an ordinary differential equation. To Write C++ computer	• CO1: To Equip them with sufficient Knowledge base of physics so that they do not find any difficulty pursuing higher Education	PSO1	U,R
				• CO2: Trained practical exposure which could equip to face the	PSO3	AN,AP

			programming necessary for numerical simulation of physical problems.	challenges in Physics.		
				• CO3: Understanding the Programming in C++ in constants and variables of the functions	PSO1	U,AC
				• CO4: To Write C++ computer programming necessary for numerical integration to trapezoidal and Simpson's 1/3 rule	PSO3	AP
				• CO5: Understand the various statements To equip the students with sufficient knowledge base of Physics so that they do not find any difficulty in pursuing higher education.	PSO3	AP

PGPI	Statistical Mechanics	Global	To learn the fundamental difference between classical and quantum statistics and learn about quantum statistical distribution law. To equip the students with sufficient knowledge base of Physics so that they do not find any difficulty in pursuing higher education.	• CO1: They easily to determine the probability of any type of an event.	PSO1	U, R
				• CO2: Students have understood the concept of phase space and its volume.	PSO1	U
				• CO3: They can To equip the students with sufficient knowledge base of Physics so that they do not find any difficulty in pursuing higher education. Easily distinguish between different To equip the students with sufficient knowledge base of Physics so that they do not find any difficulty in	PSO1	AC

				pursuing higher education. Types of particles and statistics.		
				• CO4: They can easily distribute bosons and ferm. To equip the students with sufficient knowledge base of Physics so that they do not find any difficulty in pursuing higher education. Ions and classical particles among energy levels.	PSO1	U,AN
				• CO5: After studying Fermi Dirac Statistics, students have learnt to deal with many electron systems in real life.	PSO4	AC

PGPJ	Solid State Physics	Global	• The course gives an introduction to solid state physics, and To equip the students with sufficient knowledge base of Physics so that they do not find any difficulty in pursuing higher education will enable the student to employ classical and quantum mechanical theories needed to understand the physical properties of solids.	• CO1: Students will develop range of communication and teaching skills.	PSO1	U
				• CO2: How diffraction of electromagnetic waves on solid matter can be used to obtain lattice structure.	PSO1	U,R
				• CO3: Know the concept of phonons, and how the dispersion relationship appears for different lattice structures.	PSO1	AC,.AP
				• CO4: Explain how a lattice vibrates at finite temperature, and how these vibrations determine the heat capacity and conduction.	PSO1	U, R

				• CO5: Apply models to describe defects and diffusion.	PSO4	AC
PGPE3	Nano Materials and Applications	National	To understand the theoretical concepts involved in crystal growth and thin film sciences and to learn the basic characterizing techniques of materials.	• CO1: Understand the synthesis of nano materials and their application and the impact of nano materials on environment	PSO1	U
				• CO2: Apply their learned knowledge to develop Nanomaterial's.	PSO1	U,AC
				• CO3: Choose appropriate synthesis technique to synthesize To equip the students with sufficient knowledge base of Physics so that they do not find any difficulty in pursuing higher	PSO4	AC,AN

				education. Quantum nanostructures of desired size, shape and surface properties. • CO4: Appreciate enhanced sensitivity of nanomaterial based materials and their To equip the students with sufficient knowledge base of Physics so that they do not find any difficulty in pursuing higher education. Novel applications in industry. • CO5: Understand the synthesis of Nano materials and their application and the impact of To equip the		
					PSO1	AC,AN
					PSO4	U,AC

				students with sufficient knowledge base of Physics so that they do not find any difficulty in pursuing higher education. • Nano materials on environment		
PGPE4	Communication Physics	Regional	Students will demonstrate an understanding of multiple theoretical perspectives and diverse intellectual traditions in communication.	• CO1: Demonstrate critical and innovative thinking • CO2: Display competence in oral, written and visual communication. • CO3: Show an understanding of opportunities in the field	PSO-2,4 PSO-2 PSO-4	U U U

				of communication. • CO4: Students will demonstrate an understanding of the impact of physics and science on society • CO5: Identify the applications in communications.		
PGPL	Nuclear and Particle Physics	National	To learn the various aspects of nucleus and its behavior under various conditions.	• CO1: Determine nuclear properties such as binding energy, spin and parity in the framework of the liquid drop model and the shell model of the nucleus. • CO2: Use the liquid drop model and the law of radioactive decay to describe alpha-decay,	PSO-2 PSO1 PSO1,4	R U U,R

				beta-decay, fission and fusion, predict decay reactions and calculate the energy release in nuclear decays • CO3: It will teach the students about the spin parity concept &magic no. Related to shell. • CO4: About the scattering process how it will occur. • CO5: Explain the experimental evidence for quarks, gluons, quark confinement, asymptotic freedom, sea quarks, the running coupling constant and colour charge	PSO1 PSO1 PSO1	U AC U,AC

PGPM	Advanced Physics	National	To learn the basics and the advanced applications of physics in the fields of Astrophysics, Biomedical and wireless communication.	• CO1: Able to use radio astronomical data to measure physical properties of astronomical targets.	PSO1	U
				• CO2: Identify and solve basic communication problems, analyse transmitter and receivers.	PSO1	AN,AC
				• CO3: Demonstrate measuring of basic medical parameters	PSO4	U
				• CO4: Analyse the radio channel characteristics and the cellular principles	PSO4	U,AC
				• CO5: Ability to analyse improved data services in cellular communication.	PSO4	U,AC

PGPE5	Advanced Experimental Techniques	Regional	Students will learn some new advanced topics such as: quantization of electrical conductance, Coulomb Blockade, quantum capacitance and etc.	• CO1: Understand the principle and structure of optical fibers.	PSO-2,4	U
				• CO2: Understand the working principle of fiber optical sources and couplers and apply it in the optical communication systems	PSO-2	U
				• CO3: Apply the fundamental principles of optics and light wave to design optical fiber communication systems.	PSO-4	U
				• CO4: Understand different analog and digital transmission systems.	PSO-2	R

				• CO5: Understand and apply the concepts of coherent optical modulation and detection techniques.	PSO-4	U, AC