

BON SECOURS COLLEGE FOR WOMEN

Nationally Accredited with 'A' Grade by NAAC

UGC Recognized 2(f) and 12(B) Institution

VILAR BYPASS, THANJAVUR - 613 006



DEPARTMENT OF PHYSICS

PROGRAMME OUTCOMES:

PO1. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

PO2. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

PO3. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings.

PO4. Effective Citizenship Obtain quality education in the basic areas of Botany

PO5. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

PO6. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development

PO7. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes.

PROGRAM SPECIFIC OUTCOME:

PSO1 : Students will understand the basic laws and explore the fundamental concepts of physics

PSO2: Students will understand the concepts and significance of the various physical phenomena.

PSO3: Students will carry out experiments to understand the laws and concepts of Physics

PSO4: Students will apply the theories learnt and the skills acquired to solve real time problems.

PSO5: Students will acquire a wide range of problem solving skills, both analytical and technical and to apply them.

PSO6: Students will enhance the student's academic abilities, personal qualities and transferable skills this will give them an opportunity to develop as responsible citizens.

PSO7: Students will be provided a hands-on learning experience such as in measuring the basic concepts in properties of matter, heat, optics, electricity and electronics

COURSE OUTCOMES FOR UNDER GRADUATE

NAME OF THE COURSE	COURSE OUTCOMES	COURSE LEARNING OUTCOME	BLOOM TAXONOMY
Properties of Matter and Acoustics	CO ₁	Acquire knowledge about the basic characteristics to the matter through their properties	L ₁
	CO ₂	Determine the properties of bending on beams	L ₁
	CO ₃	Correlate the property of surface tension of liquids with different natural phenomena.	L ₄
	CO ₄	Define Viscosity and describe how viscosity can be measured	L ₁
	CO ₅	Familiarise with general terms in acoustics like intensity, loudness, reverberation etc, and study in detail about production, detection, properties and uses of ultrasonic waves.	L ₁
	CO ₆	Apply physical principle in analysing acoustical systems	L ₃
Practical I	CO ₁	Determine certain physical constants and properties	L ₁
	CO ₂	Verify the physical constants	L ₂
Mechanics	CO ₁	Understands the need and knowledge of the projectile motion, impulse. .	L ₂
	CO ₂	Ability to evaluate the usefulness of impact	L ₄
	CO ₃	Learn basics of the kinematics and dynamics linear and rotational motion	L ₁
	CO ₄	Learn the basics of potentials and fields, central forces and Kepler's laws	L ₁
	CO ₅	Acquire basic knowledge of Moment of inertia and oscillation.	L ₁
	CO ₆	Solve the equations of Newtonian Gravity and central force problem	L ₁
Thermal Physics	CO ₁	Acquire the knowledge of the nature of calorimetry by specific heat of solids	L ₁
	CO ₂	Define and describe law of thermodynamics and entropy	L ₁
	CO ₃	Understanding the low temperature physics	L ₂
	CO ₄	Analyses thermal conductivity and black body radiation	L ₃
	CO ₅	Apply the statistical methods	L ₃
	CO ₆	Define zeroth law of thermodynamics and entropy	L ₁
Electricity, Magnetism and Electromagnetism	CO ₁	Understand the concept of principle & working of capacitors. Demonstrate law, and apply it to systems	L ₂
	CO ₂	Analyse the chemical and heating effect of current	L ₄
	CO ₃	Understand the dielectric properties, magnetic properties of materials and the	L ₂

		phenomena of electromagnetic induction.	
	CO ₄	Apply Kirchhoff's rules to analyze AC circuits consisting of parallel and/or series combinations of voltage sources and resistors and to describe the graphical relationship of resistance, capacitor and inductor.	L ₃
	CO ₅	Describe how magnetism is produced and list examples where its effects are observed	L ₁
Practical II	CO ₁	Determine the Physical constants and their properties	L ₁
Optics	CO ₁	Understand the natural behaviour of aberration in lens	L ₂
	CO ₂	Study the theory and experiment of interference using air wedge, newtons rings and michelson interferometer	L ₁
	CO ₃	Understand the working of selected optical instruments like biprism, interferometer, diffraction grating, and holograms.	L ₂
	CO ₄	Study the theory and experimental past of diffraction by fresnels and fraunhoffer methods	L ₁
	CO ₅	Study the theories for production of polarization of light	L ₁
	CO ₆	Understand the theory and application of microwave, infrared and raman spectroscopy	L ₂
Atomic and Molecular Physics	CO ₁	Understand the properties of positive rays, experimental proof by frank and hertz method	L ₂
	CO ₂	Analyse the relationship between various types of couplings	L ₄
	CO ₃	Understand the properties of x-ray verification	L ₂
	CO ₄	Acquire the knowledge of photoelectric effect and free electron theory of metals	L ₁
	CO ₅	Learn about Laser and spectrum	L ₁
	CO ₆	Understand the knowledge of laser and spectra	L ₂
Electronics	CO ₁	Understand the basics of diode and working of rectifier circuits and characteristics	L ₂
	CO ₂	Analyse the characteristics of transistor and transistor biasing circuits	L ₄
	CO ₃	Analyse the relationship between amplifier and oscillators	
	CO ₄	Learn about analog systems and digital systems and their differences, fundamental logic gates, combinational as well as sequential and number systems.	L ₁
	CO ₅	Understand the process of flipflap by using mathematical operation, an op amp act as voltage regulator	L ₂

	CO6	Understand the applications of op-amps i inverting and non inverting modes.	L2
Material Science	CO1	Learn about the Crystal structure	L1
	CO2	Gains the knowledge about super conducting materials and Nano material	L1
	CO3	Acquire knowledge about the nanomaterials	L1
	CO4	Students may inculcate knowledge on smart material.	L1
	CO5	Students will get knowledge on Mechanical behaviour of materials.	L1
Practical III	CO1	Determine the Physical constants and their properties.	L1
	CO2	Learn to verify the characteristics and application of the physical constants	L1
Nuclear Physics	CO1	Explain nuclei properties, compare a drop of liquid with that of a nucleus and understand Shell model Able to understand the size of nucleus and all its properties	L1
	CO2	Describe basic radioactivity, calculate half-lives and understand radiation hazards	L1
	CO3	Distinguish between principles and working of different types of detectors, counters and accelerators	L1
	CO4	Perform the procedures for nuclear fission and fusion	L3
	CO5	Distinguish between the forces of nature, recall the properties of cosmic rays,Classify elementary particles	L3
Theoretical Physics	CO1	Acquire knowledge about lagrangian formulation	L1
	CO2	Understand the Hamilton's formulation	L2
	CO3	About the basic concept of matter waves.	L1
	CO4	Perform the theories of quantum mechanics into scrodinger wave equation	L1
	CO5	Analyse the basic functions of eigen values and eigen functions	L3
	CO6	Solve the hydrogen atom problem by using quantum mechanics.	L3
Microprocessor and 'C' Programmig	CO1	Learn the architecture of embedded systems, their classification and application	L1
	CO2	Acquire the knowledge about the architecture of microprocessor 8085	L1
	CO3	Discuss and write programming code for the basic arithmetic and logic operations available in assembly language	L1
	CO4	Understand the basic concepts of	L2

		fundamentals of operators and expressions	
	CO5	Analyse the various types of function	L3
Communication Physics	CO1	Distinguish between different amplitude modulation schemes with their advantages, disadvantages and applications.	L3
	CO2	Study the principle and working of fibre optic communication.	L1
	CO3	Learn about the principle of the RADAR communication and Doppler effect	L1
	CO4	Learn adequate knowledge about principle, working & types of satellite. To understand the basics of	L1
	CO5	Understand the basics of Wireless Communication Networks	L2
Practical IV	CO1	Develop a program in microprocessor and C++ in solving some mathematical problems	L6

PROGRAM OUTCOME FOR POST GRADUATE

PO1: Apply theoretical knowledge of principles and concepts of Physics to practical problems.

PO2: Use mathematical techniques and interpret mathematical models of physical behavior.

PO3: Demonstrate the ability to plan, undertake, and report on a programme of original work; including the planning and execution of experiments, the analysis and interpretation of experimental results.

PO4: Assess the errors involved in an experimental work and make recommendations based on the results in an effective manner.

PO5: Develop communication skills, both written and oral, for specialized and non-specialized audiences

PO6: Enhance and adopt new skills for future employability in teaching and research through seminar, internship and dissertation

PO7: Successfully compete at national and international level competitive examinations

PROGRAM SPECIFIC OUTCOME FOR POST GRADUATE

PSO1: Understand the set of physical laws, describing the motion of bodies under the influence of system of forces

PSO2: Analyze the applications of mathematics to the problems in physics & to develop the suitable mathematical method for such application & for formulation of physical theories.

PSO3: Learn the structure of solid materials & their different physical properties along with electronics & material science.

PSO4: Understand the fundamental theory of nature at small scale & level of atom & sub atomic particles.

PSO5: Assess the errors involved in an experimental work and make recommendations based on the results in an effective manner.

PSO6: Develop research skills which might include advanced laboratory techniques, numerical techniques, computer algebra, computer interfacing.

PSO7: Develop the skill to plan, execute and report results of an extended experimental or theoretical physics based project in a research environment.

COURSE OUTCOME FOR POST GRADUATE

COURSE NAME	COURSE OUTCOME	COURSE LEARNING OUTCOME	BLOOMS TAXONOMY
Mathematical Physics	C01	Learn the gauss theorem, greens theorem, strokes theorem and solve the problems	L1 &L3
	C02	Learn about special type of matrices that are relevant in physics and Solve problems related to eigen values and eigen vectors. Students will be able to learn about the concept and uses of Tensors	L1 &L3
	C03	Understand the basic knowledge of Group theory and its applications	L2
	C04	Solve different physical problems which contain complex variables.	L3
	C05	Understand Special functions like Gamma function, Beta function, Delta function, Dirac delta function, Bessel functions and their recurrence relations	L2
Classical Dynamics and Relativity	C01	Identify the Lagrangian mechanics concepts and solve the problems with the help of Lagrangian mechanics.	L1 &L3
	C02	Solve the equations of coupled oscillator and to examine the two coupled pendulums, and double pendulum related problems.	L3
	C03	Learn and apply rigid body dynamics and oscillatory motion.	L1 &L3
	C04	Learn about the Hamilton's formulation. And its application.	L1
	C05	Solve the problems of classical and relativistic mechanics	L3
Electronics	C01	Design combinational and sequential digital logic circuits	L6
	C02	Analyse and design basic op-amp circuits, linear and non-linear circits, signal generators and data converters	L4 &L6
	C03	Understand and Analyse semiconductors and opto-electronic devices	L2&L4
	C04	Design, test and analyse simple circuits using gates,	L4&L6

		flip flops, counters and registers	
	C05	Test, repair, modify and take up design exercise on digital electronics	L6
Method s of Spectroscopy	C01	Familiarize with the basic principles of various spectroscopic techniques	L1
	C02	Identify the Spectral terms and their notation.	L1
	C03	Compare and contrast atomic and molecular spectra	L4
	C04	Lear the Information about the consequence of an atom in application of electric and magnetic field.	L1
	C05	State and justify the selection rules for various optical spectroscopic in terms of the symmetries of molecular vibrations able to interpret spectra of the samples	L1
Physics Practical- I	C01	Determine certain physical constants and properties	L1
	C02	Verify the physical constants	L3
	C03	Understands the electronic components and devices.	L1
Electromagnetic Theory	C01	Define electric and magnetic fields	L1
	C02	Calculate electric and magnetic fields from stationary and dynamic charge and current distributions.	L3
	C03	Solve simple electrostatic boundary problems	L3
	C04	Be able to choose adequate models and solution methods for specific problems	L3
	C05	Be able to choose adequate models and solution methods for specific problems	L3
Qunatum Mechnics	C01	Apply the principles of quantum mechanical to calculate observables on known wave functions.	L3
	C02	Acquire fundamental knowledge on Hilbert space, hermitian Operator and Bra-ket notation.	L1
	C03	Understand the concept of Eigen value involved in one, two and three dimensional system.	L2
	C04	Solve time-dependent and time-independent Schrödinger equation for simple potentials	L3
	C05	Understand the basic knowledge on relativistic quantum mechanics. Understand combine spins and angular momentum.	L2
Physics Practical II	C01	Develop a program in microprocessor and C++ in solving some mathematical problems	L6
Microprocessor and Microcontroller	C01	Learn the internal organization of popular microprocessor/ microcontrollers.	L1
	C02	Understand the architecture of 8085 and 8051. Impart the knowledge about the instruction set	L2
	C03	Understand the basic ideas about the data transfer schemes and its application	L2
	C04	Develop skill in simple program writing for 8051& 8085 and application	L6

	C05	Learn the hardware and software interaction and integration.	L ₁
Numerical Methods and C++ Programming	C01	Solve an algebraic or transcendental equation using an appropriate numerical method	L ₃
	C02	Solve a function using an appropriate numerical method	L ₃
	C03	Solve a differential equation using an appropriate numerical method	L ₃
	C04	Evaluate a derivative at a value using an appropriate numerical value	L ₅
	C05	Solve a linear system of equations using a appropriate numerical method	L ₃
Statistical Mechanics	C01	Derive relations between thermodynamical quantities.	L ₃
	C02	Learn the basic concept of Maxwell--Boltzmann relation	L ₁
	C03	Discuss the concepts of microstate and macrostate of a model system	L ₁
	C04	Apply the Fermi-Dirac distribution to the calculation of thermal properties of electrons in metals	L ₃
	C05	Learn the ferromagnetism and paramagnetism in terms of statistical mechanics.	L ₁
Solid State Physics	C01	Learn the crystal systems and kinds of crystalline order and X ray diffraction techniques.	L ₁
	C02	Knowledge about lattice vibrations and thermal properties.	L ₁
	C03	Knowledge of Free electron theory, energy bands and semiconductor crystals	L ₁
	C04	Classify Dia , Para Ferro and Anti Ferro magnetisms	L ₂
	C05	Understands the concept of super conductors and its application and classification of Ferro electric materials.	L ₂
Physics Practicals III	C01	Determine the Physical constants and their properties.	L ₁
	C02	Learn to verify the characteristics and application of the physical constants	L ₁
Crystal Growth and Thin Film Physics	C01	Understand the basic concepts of crystal growth and formation of nucleation.	L ₂
	C02	Learn about solvents & solutions. slow cooling & slow evaporation process.	L ₁
	C03	Develop a new crystal using solution growth method. Understand the concept about gel, melt& vapour growth techniques in detail	L ₂
	C04	Students are able to implement their theoretical knowledge in their research work like sputtering, spray pyrolysis, sol gel technique	L ₁
	C05	Evaluate the properties of the material using characterisation techniques	L ₅
Non-Linear Optics	C01	Gain Knowledge in an application of the laser in various fields	L ₁
	C02	Lear the basics of harmonic generation and how light will be propagate through an isotropic material.	L ₁
	C03	Apply the principles to phenomena based on	L ₃

		frequency conversion, electro-optic effect, and nonlinear index of refraction	
	C04	Acquired the fundamental concept of photon and photon interaction, stimulated Raman scattering and the nonlinear materials used for Research.	L1
	C05	Learn types of NLO materials and its basic requirements.	L1
Nuclear and Particle Physics	C01	Learn of core concepts in physics to more advanced topics in nuclear and particle physics.	L1
	C02	Understand the concept of alpha emission, types , basic principles of particle detectors	L2
	C03	Explain about shell models & magic numbers	L1
	C04	Describe fission & fusion reactions, construction and working principle of thermal reactors.	L1
Advanced Physics	C01	Learn astro physics & life cycle of stars and the concept of galaxy & universe.	L1
	C02	Illustrates the India's space programme and also to know about the purpose of launching satellites.	L2
	C03	Explain the working principle of bio medical Instruments in medical field.	L1
	C04	Determine the type and appropriate model of wireless fading channel based on the system parameters and the property of the wireless medium.	L1
	C05	Analyse receiver and transmitter diversity techniques	L4
	C06	Explain the real life applications of wireless communication technology	L1
Physics Practical-IV	C01	Learn to verify the electronic devices	L1
Nanophysics	C01	Explain the nano science and technology in light of quantum confinement. Understand various phenomenon's like quantum dot, quantum wire.	L1
	C02	Understand the basic knowledge about C60 molecules	L2
	C03	Synthesis a nanoparticle using various synthesis techniques with proper understanding	L6
	C04	Analysis the nano crystal with structural and opto electrical properties	L4
	C05	Understanding regarding the basic principle behind the various microscopic techniques.	L2
Project	C01	Design and evaluate the Problem	L5 & L6