FATIMA COLLEGE (AUTONOMOUS), MADURAI – 625018

NAME OF THE PROGRAMME: M. SC. PHYSICS **PROGRAMME CODE: PSPH**

PROGRAMME OUTCOMES:

Students will be able to

PO1: Apply acquired scientific knowledge to solve major and complex issues in the society/industry

PO2: Attain research skills to solve complex cultural, societal and environmental issues

PO3: Employ latest and updated tools and technologies to solve complex issues

PO4: Demonstrate Professional Ethics that foster Community, Nation and Environment Building Initiatives.

PROGRAMME SPECIFIC OUTCOMES:

Students will

PSO1: Acquire thorough knowledge of the basic concepts of the frontier areas of Physics comprising Mathematical Physics, Electromagnetic theory, Classical Mechanics, Quantum Mechanics, Condensed Matter Physics, Nuclear Physics, Numerical Methods, Communication systems, Molecular Spectroscopy, Material Science and Advanced Quantum Mechanics.

PSO2: Understand and solve the physics problems in everyday life using the acquired basic knowledge.

PSO3: Develop skills to perform experiments based on the theoretical understanding

PSO4: Apply the knowledge acquired to analyse and design models in the versatile realm of physics

PSO5: Equip with the essential foundations for higher education and research in physics.

2019 - 2020

COURSE CODE	COURSE TITLE	NATURE OF THE COURSE (LOCAL/ NATIONAL/ REGIONAL/ GLOBAL)	COURSE DESCRIPTION	COURSE OUTCOMES
19PG1P1	Introduction To Mathematical Physics	National	This course emphasises the basic concepts and applications of Mathematical Physics which involves vectors, matrices, integral transforms and special	CO 1 : Define and deduce gauss divergence and stokes theorem and solving problems on gauss divergence and stokes theorem CO 2 : Discuss orthogonal curvilinear coordinates and spherical polar coordinates and solving problems

			functions	using these coordinates CO 3 : Explain special type of matrices and its Eigen value problems and illustrate the properties of Fourier and Laplace transforms CO 4 : Define Beta and Gamma Functions and find its relations
19PG1P2	Applied Electronics	National	This course aims to introduce applied electronics to students, encompassing the concepts of semiconductor diode characteristics, Op-Amp characteristics, registers , counters, and analog to digital conversion techniques.	CO 1 : Students will be able to distinguish between BJT and FET CO 2 : Students will be able to explain the fundamental concepts of diode, BJT and transistor biasing to understand the small signal behaviour of FET for amplification applications CO 3 : Students will be able to Outline the basics of linear and non linear systems

				CO 4 : Students will be able to describe the design concept of counters and shift registers CO 5 : Students will be able to apply the theory of OPAMP to design the linear non linear applications of it CO 6 : Students will be able to describe the design concepts of counters and shift registers. Demonstrate the various techniques to develop A/D and D/A converters
19PG1P3	Classical Mechanics	National	This course imparts a thorough knowledge of Mechanics of single particle and a system of particles, applying various classical theories. This would	CO 1 : To identify different types of constraints imposed on systems CO 2 : To derive Lagrange's equation from Hamilton's variational principle and to write the equation of motion for any given system according to Lagrangian

			help them to analyse any system using classical mechanics.	formulation. CO 3 : To explain the two body central force problem and classification of orbits and hence to discuss scattering in a central force field. CO 4 : To apply the theory of small oscillations to a linear triatomic molecule and get the normal modes and normal frequencies of the same. CO 5 : To derive Hamilton's equations using Legendre transformation. CO 6 : a) To evaluate the connection between conservation theorems and symmetry properties of the system. b) To solve problems related to canonical transformations and

				Poisson brackets.
19PG2P6	Principles in Advanced Mathematical Physics	National	This course emphasise the basic concepts and applications of Mathematical Physics which involves complex variables, tensors, Dirac delta, Greens function and group theory	CO 1 : Perform algebra with complex numbers and to Identify and determine the differentiable functions and find its derivatives CO 2 : Identify the singularities of a function and determine whether they are removable poles are essential CO 3 : Perform algebra of tensors and apply four vectors in special relativity and the formulation of electrodynamics CO 4 : Discuss greens function for Sturn – Liouville operator and to compute dirac delta functions Green's functions and solving problems

				CO 5 : Represent delta function and apply delta calculus CO 6 : Describe group, cyclic group, sub group and multiplication tables Prove great orthogonality theorem and construct character tables of a group.
19PG2P7	Quantum Mechanics	National	This course introduces Schrodinger equation, general formalism of quantum mechanics, exactly soluble Eigen value problems , representations and angular momentum.	CO 1 : To analyze the inadequacy of Classical mechanics to explain black body radiation, photoelectric effect, specific heat of solids and Compton effect. CO 2 : To discuss the basic postulates of Quantum mechanics. CO 3 : To explain the general formalism of wave function and to write the Schrodinger's equation and obtain the Eigen values and Eigen

				functions of a particle in a square potential well; To discuss the problem of barrier penetration. CO 4 : To solve the problem of Simple harmonic oscillator by Schrodinger's method and also by abstract operator method. CO 5 : a) To compare Schrodinger's notation with Dirac notation and to discuss the representation of state vectors and operators. b) To outline the matrix representation of orbital and spin angular moment and to calculate Clebsch - Gordon coefficients.
19PG2P8	Electromagnetic Theory	National	The purpose of this course is to provide the methods to analyse	CO 1 : Gain insight about the electric field and their charge distribution at various condition such as in

			and understand the static electric field, the static magnetic field, and electromagnetic wave propagation. The course provides a basic knowledge of fundamental principles behind Electromagnetic Theories and Phenomena.	static and moving fields CO 2 : Cultivate knowledge in dealing with the static electric field in dielectric media and their elaborated parameter study. CO 3 : Develop thorough knowledge of static and moving magnetic fields of steady current and charged particles. CO 4 : Detailed understanding of time dependent electric and magnetic fields and their wave propagation properties. CO 5 : Acquire essential knowledge in circuitry in transmission lines and wave guides and a detailed study about antenna.

COURSE CODE	COURSE TITLE	NATURE OF THE COURSE (LOCAL/NATIONAL/ REGIONAL/GLOBAL)	COURSE DESCRIPTION
PG3P11	Solid State Physics-1	National	• The purpose of this course is to provide a sound foundation in condensed matter physics especially in Crystallography, X-ray diffraction, Phonons, Free electron Fermi gas, Energy bands, Semiconductor crystals and Fermi surfaces.
PG3P12	Numerical methods & Programming in C++	National	• The objective of this course is to enable the students to learn the various numerical methods to solve algebraic & transcendental equations and also numerical differentiation and integration. Also it provides object oriented techniques to write programs in C++ especially for all the numerical methods
PG3P13	Nuclear and Particle Physics	National	• The aim of this course is to provide an overview of the fields of nuclear and particle physics.
PG3PE1A/B	Communication	National	• The aim of this course is to provide a sound

	Systems/Microcontroller 8051		foundation in communication systems.
PG4P14	Solid State Physics II	National	• This course deals with Plasmons, Polaritons, Polarons, Excitons, Superconductivity, Dielectrics and Ferroelectrics, Diamagnetism and Paramagnetism, Ferromagnetism and Antiferro magnetism.
PG4P15	Molecular Spectroscopy	National	• The aim of this course is to introduce the methods employed in molecular spectroscopy and the application of spectroscopy.
PG4P16	Advanced Quantum Mechanics	National	• This course deals with the approximation methods for stationary states, evolution of time concepts, scattering theory and relativistic quantum mechanics.
PG4PE2A/B	Materials Science/ AstroPhysics	National	• Materials science occupies the centre of the innovative research area. This course deals with the various crystal growth techniques, characterization methods, thin films, nano

			materials and other types of materials such as polymers and ceramics and glass.

2018 – 2019

COURSE CODE	COURSE TITLE	NATURE OF THE COURSE (LOCAL/NATIONAL/ REGIONAL/GLOBAL)	COURSE DESCRIPTION
PG1P1	Mathematical Physics	National	• The aim of this course is to provide the mathematical foundation in vectors, matrices, special functions and Fourier and Laplace transforms required for the description of the physical phenomena.
PG1P2	Applied Electronics	National	• This course aims to understand the concepts of Applied Electronics and their applications
PG1P3	Classical Mechanics	National	• This course imparts a thorough knowledge of

			Mechanics of single particle and a system of particles, applying various classical theories. This would help them to analyse any system using classical mechanics.
PG1P4	Electromagnetic Theory	National	• The purpose of this course is to provide the methods to analyse and understand the static electric field, the static magnetic field, and electromagnetic wave propagation.
PG2P5	Mathematical Physics II	National	• This course aims at the introduction of advanced mathematical tools such as complex variables, group theory and tensor analysis.
PG2P6	Microprocessor & Microcontroller	National	• This paper aims at providing the students with an exposure to the popular microprocessor Intel 8086
PG2P7	Quantum Mechanics	National	• This course introduces Schrodinger equation, general formalism of quantum mechanics, representations and angular momentum.

PG2P8	Modern Optics	National	• This course aims at introducing interference, optics of solids, and principle of fibre optic communication and Fourier techniques in optics
PG3P11	Solid State Physics-1	National	• The purpose of this course is to provide a sound foundation in condensed matter physics especially in Crystallography, X-ray diffraction, Phonons, Free electron Fermi gas, Energy bands, Semiconductor crystals and Fermi surfaces.
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PG3P13	Nuclear and Particle Physics	National	• The aim of this course is to provide an overview of the fields of nuclear and particle physics.

PG3PE1A/B	Communication Systems/Microcontroller 8051	National	• The aim of this course is to provide a sound foundation in communication systems.
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2017 – 2018

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PG4PE2A/B	Materials Science/Astro Physics	National	• Materials science occupies the centre of the innovative research area. This course deals with the various crystal growth techniques,

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2016 – 2017

COURSE CODE	COURSE TITLE	NATURE OF THE COURSE (LOCAL/NATIONAL/ REGIONAL/GLOBAL)	COURSE DESCRIPTION
PG1P1	Mathematical Physics	National	• The aim of this course is to provide the mathematical foundation in vectors, matrices, special functions and Fourier and Laplace transforms required for the description of the physical phenomena.
PG1P2	Analog Electronics	National	• This course aims to understand the concepts of Applied Electronics and their applications
PG1P3	Classical Mechanics	National	• This course imparts a thorough knowledge of Mechanics of single particle and a system of

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PG1P4	Electromagnetic Theory	National	• The purpose of this course is to provide the methods to analyse and understand the static electric field, the static magnetic field, and electromagnetic wave propagation.
PG2P5	Mathematical Physics II	National	• This course aims at the introduction of advanced mathematical tools such as complex variables, group theory and tensor analysis.
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PG4PE2A/B	Materials Science/AstroPhys	National	• Materials science occupies the centre of the innovative research area. This course deals with

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2015 – 2016

COURSE CODE	COURSE TITLE	NATURE OF THE COURSE (LOCAL/NATIONAL/ REGIONAL/GLOBAL)	COURSE DESCRIPTION
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PG1P2	Analog Electronics	National	• This course aims to understand the concepts of Applied Electronics and their applications
PG1P3	Classical	National	• This course imparts a thorough knowledge of Mechanics of single particle and a system of

	Mechanics		particles, applying various classical theories. This would help them to analyse any system using classical mechanics.
PG1P4	Electromagnetic Theory	National	• The purpose of this course is to provide the methods to analyse and understand the static electric field, the static magnetic field, and electromagnetic wave propagation.
PG2P5	Mathematical Physics II	National	• This course aims at the introduction of advanced mathematical tools such as complex variables, group theory and tensor analysis.
PG2P6	Advanced Microprocessors	National	• This paper aims at providing the students with an exposure to the popular microprocessor Intel 8086
PG2P7	Quantum Mechanics	National	• This course introduces Schrodinger equation, general formalism of quantum mechanics, representations and angular momentum.

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