PROGRAMME OUT COMES, PROGRAMM E SPECEFIC OUTCOMES AND COURSE OUT COMES

B.SC PHYSICS PROGRAMME OF CALICUT UNIVERSITY

Programme Specific Outcomes

PSO1: Understand the basic concepts of methodology of science and the fundamentals of mechanics, properties of matter and electrodynamics

PSO2: Understand the theoretical basis of quantum mechanics, relativistic physics, nuclear physics, optics, spectroscopy, solid state physics, astrophysics, statistical physics, photonics and thermodynamics

PSO3: Understand and apply the concepts of electronics in the designing of different analog and digital circuits

PSO4: Understand the basics of computer programming and numerical analysis **PSO5:** Apply and verify theoretical concepts through laboratory experiments

Course Outcomes

Title Of Paper **METHODOLOGY OF SCIENCE AND PHYSICS**

Course Code PH1 B01 Credits- 2 Total Hours- 36

This course provides the student with COURSE OBJECTIVES (1) A general idea about what is science, what is scientific temper, history of science and scientific revolutions (2). Familiarity with the different steps involved in the scientific method with the help of a flow chart, explaining what is hypothesis and how they become scientific laws(3). Awareness of a brief history of physics, giving emphasis on the birth of quantum theory using black body radiation, photoelectric , X rays and DeBroglie waves and a general idea about theory of relativity(4): Introduction to mathematical methods physicists often use, including differential Calculus, The operator - Gradient, Divergence, Curl, integral calculus, matrices and curvilinear coordinates

Title Of Paper **PROPERTIES OF MATTER, WAVES & ACOUSTICS**

Course Code PH2 B02 Credits 2 Total Hours 36

After successful completion of the course, the student is expected to (1): Learn the basics of properties of matter, how Young’s modulus and rigidity modulus are defines and how they are

evaluated for different shapes of practical relevance (2): Learn the fundamentals of harmonic oscillator model, including damped and forced oscillators and grasp the significance of terms like quality factor and damping coefficient (3).Study the general equation of wave motion in general and TM waves in stretched strings and longitudinal waves in gases (4).Familiarise with general terms in acoustics like intensity, loudness, reverberation etc, and study in detail about production, detection, properties and uses of ultrasonic waves.

Title Of Paper **MECHANICS**

Course Code PH3 B03 Credits 4 Total Hours 56

On successful completion of the course students would have (1): Grasped the fundamentals of different types of frames of references and transformation laws- Both Galilean and Lorentz(2). Learned conservation laws of energy and linear and angular momentum and apply them to solve problems (3). Learn the basics of potentials and fields, central forces and Kepler's laws (4).Familarise with Lagrangian and Hamiltonian formulations of classical mechanics (5). Fundamental ideas of special theory of relativity such as length contraction and time dilation and mass –energy invariance

Title Of Paper **ELECTRODYNAMICS I**

Course Code PH4B04 Credits 4 Total Hours 54

After successful completion of the course, the student is expected to : C01: Have gained elaborated knowledge about electrostatics and laws governing the charge distributionC02:Have gained ability to apply Laplace equation for calculating potentials. C03:Study in depth about Polarization, bound charges and boundary condition. C04:To realize the importance of application of Biot Savarts Law and Amperes law.C05:To understand the relevance of different magnetization and the boundary condition of magnetic field.

Title of the paper **ELECTRODYNAMICS II**

Course Code **PH5B06 Credits 3 Total Hours 54**

After successful completion of the course, the student is expected to :C01 :be able to solve a variety of problems related to Faraday's law of induction and Maxwell's equations. Student is expected to explain term displacement current as well.C02 :understand the relevance of displacement current in the context of electromagnetic wave propagation.C03 : study in depth the transient current response of CR, LC, CR and LCR circuits, which is essential in designing as well as understanding the working of electronic circuits.C04:solve

complex problems involving linear electrical networks employing the symmetry concepts together with various network theorems

Title of the paper QUANTUM MECHANICS C

ourse Code PH5 BO7 Credits 3 Total Hours 54

After successful completion of the course, the student is expected to:C01: To become familiar with Blackbody radiation, Ultraviolet catastrophe, Photo Electric effect and Compton Effect and hence be aware how quantum theory emerged C02Have gained a clear knowledge about wave properties of particles, De Broglie waves and its implications on the Uncertainty principle. C03: Study the Bohr Atom model in detail and understand about atomic excitations C04:ave grasped the idea of Wave Mechanics and gain the concept of eigen values, eigen functions and learn the basic postulates of quantum mechanics C05:o find solution to Schrödinger's equation for many systems such as particle in a box, Hydrogen Atom and familiarize with different quantum numbers.

Title of the paper PHYSICAL OPTRICS AND MODERN OPTICS

Course Code PH5BO8 Credits 3 Total Hours 54

On successful completion of the course students will be able to: C01. Understand the basics of the Matrix method to solve problems of geometrical optics C02. Use the principles of wave motion and superposition to explain the physics of polarisation, interference and diffraction. C03. Understand the basics of modern optics like Fiber optics and holographyC04. Solve problems in optics by selecting the appropriate equations and performing numerical or analytical calculations.

Title of the paper ECTRONICS (ANALOG & DIGITAL)

Course Code PH5BO9 Credits 4 Total Hours 72

After successful completion of the course, the student is expected to CO1have a basic knowledge of semiconductor physics CO2 acquire knowledge about how a semiconductor diode rectifies an input ac signal CO3 Learn how to construct a transistor amplifier and how its gain varies with frequencyCO4 know about various number systems and their applications , flip flops and counters

Title of the paper THERMAL AND STATISTICAL PHYSICS

Course Code **PH5B10** **Credits** **4** **Total Hours** **72**

After successful completion of the course, the student is expected to C01:Become familiar with various thermodynamic process and work done in each of these process. C02:Have a clear understanding about Reversible and irreversible process and also working of a Carnot engine, and knowledge of calculating change in entropy for various process. C03:Realize the importance of Thermo dynamical functions and applications of Maxwell's relations. C04: Familiarize in depth about statistical distribution and have basic Ideas about Maxwell-boltzman,Bose-Einstein and Fermi Dirac Statistics and their applications

Title of the paper **SOLID STATE PHYSICS,SPECTROSCOPY AND LASER PHYSICS**

Course Code **PH6B11** **Credits** **4** **Total Hours** **72**

After successful completion of the course, the student is expected to : C01:Have a clear picture of crystal structures and a clear understanding about x-ray diffraction C02:Expected to gain knowledge of superconductivity, its underlying principles and its applications in modern world C03:Become familiar with molecular spectroscopy and have gained basic ideas regarding microwave spectroscopy, infrared spectroscopy and Raman Spectroscopy. C04:Have gained basic knowledge of laser and working of different type of lasers

Title of the paper **NUCLEAR PHYSICS, PARTICLE PHYSICS AND ASTROPHYSICS**

Course Code **PH6B12** **Credits** **4** **Total Hours** **72**

After successful completion of the course, the student is expected to : 01:Gain a clear picture of nuclear composition and various nuclear models. C02: Have a deep knowledge about Radio activity, nuclear Fission and Nuclear Fusion, the relevance of nuclear transformation. C03: Understand the working of nuclear detectors and counters, realize the importance of Cosmic rays and its effects on earth C05: Become familiar with nuclear particles and different particle accelerators. Student is expected to know the working of different accelerators. C06: Have Peripheral ideas about astronomy and astrophysics

OPEN COURSES OFFERED BY PHYSICS

DEPARTMENT Objective

To develop scientific temper and attitude in students from other streams.

Title of the paper **NON CONVENTIONAL ENERGY SOURCES Course Code** **PH5 DO1 (1) Credits 2 Total Hours 50**

Since the course does not require a solid base in physics, the student is only expected to develop CO1: Qualitative ideas about Solar energy, Physical principle of conversion of solar energy into heat energy, solar energy harvesting devices like solar cells, solar cookers, solar greenhouses etc. CO2 Gets an idea about basic principle of wind energy conversion and basic components of wind energy conversion systems. CO3 Elementary idea of Geothermal energy sources, its applications and method of obtaining energy from biomass. CO4. Know about other non-conventional energy sources like Ocean Thermal Energy Resources, Wind energy and Chemical energy resources.

BSc Physics Complimentary

Title of the paper **COMPLIMENTARY COURSE- OPTICS, LASERS, ELECTRONICS AND COMMUNICATION**

Course Code **PH3C03 Credits** **2 Total Hours 54**

After successful completion of the course, the student is expected to : C01 : To have developed the idea of interference, diffraction and polarization and to solve problems related to the phenomena C02 : understand about different laser systems and its applications C03 : study about Basics electronics Technology C04 : Realize the importance of different electronic communication systems.

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