RIZVI COLLEGE OF ARTS, SCIENCE AND COMMERCE

Department of Physics

Bachelor of Science ( Physics)

**Program Outcomes**

1. The student will understand the various theories and principles in different branches of Physics namely Mechanics, Optics, Thermal physics, Atomic- Molecular and Nuclear physics, Electricity Electronics, Instrumentation, Relativity, Modern physics, Solid state physics, Applied Physics and etc.
2. Understand the fundamentals and significance of various phenomena through theory and related practicals and laboratory skills.
3. Understanding the theory learnt and develop a skill to solve wide range of numerical problems both the quantitative and quantitative and or real time.
4. Handling skillfully the various physics apparatus and various analogue, digital instruments to perform different mechanics, optics, electricity, electronics experiments with higher accuracy through measurements and error elimination techniques ( mathematical and instrumental ).
5. Upgrade the academic skills to excel in different competitive exams and to PG- courses after graduation and or research.

**Program Specific Outcomes (PSO)**

**Achieve professional competency in the field of pure science (Theoretical and Applied Physics ) and develop interpersonal skills through this course.**

NOTE: COGNITIVE LEVELS MARKED AS PER THE BLOOM’S TAXONOMY

Course Outcomes

**FY BSc -- Sem -- 1**

**Paper Title:: Classical and Thermal Physics**

**Paper Code :: USPH101**

|  |  |  |  |
| --- | --- | --- | --- |
| Course outcome | **On completion of this course the student will be able to \_\_\_\_** | PO address | Cognitive level |
| CO1 | **Understand Newton's laws of kinematics work energy theorem and its application through number of suitable examples with problem solving.** | **PO1 PO2 PO3 PO4** | **R, U AP, An** |
| CO2 | **Know the basics of fluid dynamics and various laws of thermodynamic systems of solids gases and liquids. Applied the concepts through good number of solving problems.** | **PO1 PO2 PO3 PO4** | **R, U, AP, An** |
| CO3 | **Think practice and analyse the basic and fundamental concepts in Physics** | **PO1 PO2 PO3 PO4** | **R, U, AP, An ,E** |

**Paper Title:: Nuclear Physics.**

**Paper Code:: USPH102**

|  |  |  |  |
| --- | --- | --- | --- |
| Course outcome | **On completion of this course the student will be able to \_\_\_** | PO attended | Cognitive level |
| CO1 | **Understand different properties of nucleus, nuclear reactions, concept of radioactivity its application and different types of equilibria in radioactive elements.** | **PO1 PO2 PO3** | **R, U, AP,** |
| CO2 | **Understand the design/ construction/working of various nuclear detectors and their applications** | **PO1 PO2 PO3** | **R, U , AP, AN** |
| CO3 | **Understand basic principles of introduction to Quantum mechanics and to practice quantitative examples by problem solving** | **PO1 PO2 PO3** | **R, U, AP, AN** |

**FY BSC -- Sem 2**

**Paper Title :: Optics**

**Paper code : USPH201**

|  |  |  |  |
| --- | --- | --- | --- |
| Course outcome | **On completion of this course the student will be able to** | PO attended | Cognitive level |
| CO1 | **Learn and understand the basic lens and lens systems, defects and their minimization also working /design of various optical instruments.** | **PO1 PO2 PO3 PO4** | **R, U, AP, An** |
| CO2 | **Understand reflection, refraction, interference phenomena of electromagnetic radiation. Solving quantitative numericals on the concept.** | **PO1 PO2 PO3 PO4** | **R, U, AP, AN** |
| CO3 | **Understand laser, optical fibre construction / working and useful applications in daily life and in modern communication** | **PO1 PO2 PO3 PO4** | **R, U, AP, AN** |
| CO4 | **Think practice, analyse the basic fundamental concepts through solving examples.** | **PO1 PO2 PO3 PO4** | **R, U, AP, AN, E** |

**Paper Title :: Electricity and Electronics**

**Paper Code :: USPH202**

|  |  |  |  |
| --- | --- | --- | --- |
| Course outcome | **On completion of this course student will be able to** | PO attended | Cognitive level |
| CO1 | **Understand the basic concepts of AC circuits and Electrical theorems useful for circuit understanding and designing. Their applications .** | **PO1 PO2 PO3 PO4** | **R, U, AP, An, E** |
| CO2 | **Understand the basics of Transistor amplifier, Oscillators, Power supplies etc in analogue /digital electronics and apply them in the real time situation.** | **PO1 PO2 PO3 PO4** | **R,. U,. AP,. AN, E** |
| CO3 | **Understand the theory of electromagnetism by solving quantitative and qualitative examples.** | **PO1 PO2 PO3 PO4** | **R, U, AP, AN,** |

**SY BSc :: Sem 3**

**Paper Title:: Mechanics and Thermodynamics**

**Paper Code :: USPH301**

|  |  |  |  |
| --- | --- | --- | --- |
| Course outcome | **On completion of this course the learner would be able to….** | PO attended | Cognitive level |
| CO1 | **Understand concept of mechanics and properties of matter by applying them to various numerical examples** | **PO1 PO2 PO3** | **R, U, AP, An , E** |
| CO2 | **Know the properties and basic concepts in thermodynamics to various parameters, PV diagram, process cycles and equilibrium.** | **PO1 PO2 PO3 PO4** | **R, U, AP, AN** |
| CO3 | **Apply laws of thermodynamics and entropy concepts in analysing the thermal efficiency of heat engines ( Refrigerator)** | **PO1 PO2 PO3 PO4** | **R, U , AN, AP** |
| CO4 | **Understand the concepts in low temperature physics by different methods of liquefaction of gases and to demonstrate through hypothetical-problem solving.** | **PO1 PO2 PO3** | **R, U, AP, AN.** |

**SY BSc :: Sem-- 3**

**Paper Title :: Vector calculus and Analog electronics.**

**Paper Code:: USPH302**

|  |  |  |  |
| --- | --- | --- | --- |
| Course outcome | **On completion of this course the learner would be able to.....** | PO attended | Cognitive level |
| CO1 | **Understand / apply concepts of vector calculus, there applications in orthogonal curvilinear co-ordinate systems by various numerical problems using tools like line / surface /volume integrals and fundamental theorems.** | **PO1 PO2 PO3** | **U, R, AP, AN** |
| CO2 | **Revise / Analyse the CE/CB/CC modes of transistor for various types of biasing methods by solving different numericals to design / construct circuits and related practical measurements.** | **PO1 PO2 PO3 PO4** | **R, U, AP, AN** |
| CO3 | **Number of basic principles of general amplifiers /amplification. Apply them for different applications with feedback circuits / oscillators.** | **PO1 PO2 PO3 PO4** | **R, U, AP, AN, E** |
| CO4 | **Apply the knowledge quantitatively for problem solving and develop basic electronics circuits in laboratory to apply concepts in analogue electronics.** | **PO1 PO2 PO3 PO4** | **R, U, AP, An ,E** |

**SY BSc:: Sem- 3**

**Paper Title :: Applied Physics**

**Paper Code :: USPH303**

|  |  |  |  |
| --- | --- | --- | --- |
| Course outcome | On completion of this course the learner would be able to | PO attended | Cognitive level |
| CO1 | Understand and apply the role of Physics in interdisciplinary areas related to material properties and applications for example in acoustics , optical fibre, LED's , LCD-electromagnetic materials etc . | PO1 PO2 PO3 | R, U, AP, AN. |
| CO2 | Understand various types of crystal structures/ symmetry in crystals, lattice constants. Demonstrate the 3D-models. | PO1 PO2 PO3 PO4 | R, U, AP, AN. E |
| CO3 | Understand construction/ working, merits and demerits of devices and their applications in various interdisciplinary fields | PO1 PO2 PO3 PO4 | R, U, AP, AN |

SY BSc :: Sem-4

Paper Title :: Optics and Digital Electronics

Paper Code :: USPH401

|  |  |  |  |
| --- | --- | --- | --- |
| Course outcome | On completion of this course student will be able to | PO attended | Cognitive level |
| CO1 | Understand the theory of diffraction and polarization and applied them in physical situation | PO1 PO2 PO3  PO4 | R, U, AP, AN |
| CO2 | Understand the theory and working of digital circuits problem solving with digital number systems | PO1 PO2 PO3 PO4 | R, U, AP, AN, |
| CO3 | Problem solving skills in all above the topics, think, practice and analyse the fundamental concepts and physics. | PO1 PO2 PO3 PO4 | R, U, AP, AN,E |
| CO4 | Demonstrate and verification of construction of circuits in digital electronics in Practicals - in laboratory. | PO1 PO2 PO3 PO4 | R,U, AP, AN, E, C |

SY BSc :: Sem --4

Paper Title:: Quantum Physics

Paper Code :: USPH402

|  |  |  |  |
| --- | --- | --- | --- |
| Course outcome | On completion of this course the student will be able to | PO attended | Cognitive level |
| CO1 | Understand basic postulates of quantum mechanics. Use of mathematical tools like operators /wave functions/ Eigen values / operators to study a brief review of foundations of quantum mechanics. | PO1 PO2 PO3 | R, U, AP, AN |
| CO2 | Solve quantitative problems on potential well / step potential /potential barrier etc. using Schrodinger eqns. | PO1 PO2 PO3 | R, U, AP, AN |
| CO3 | To apply and analyse the principles of quantum physics in explaining the significant phenomena in other branches of Physics | PO1 PO2 PO3 | R, U, AP, AN |

SY BSC :: Sem- 4

Paper Title :: Applied Physics -2

Paper Code :: USPH403

|  |  |  |  |
| --- | --- | --- | --- |
| Course outcome | On completion of this course student will be able to | PO attended | Cognitive level |
| CO1 | Learn and understand the architecture of 8085 microprocessor and programming with different instruction sets. | PO1 PO2 PO3 PO4 | R, U, AP, AN, E |
| CO2 | Understand the quantitative and qualitative theory of Physics in evolution of the earth. Introduction of electric and magnetic fields of the Earth and the applications of physics to the geophysics / geomagnetism. | PO1 PO2 PO3 | R, U, AP, AN |
| CO3 | Understand the different modes of communication techniques by analytical treatment. Problem solving and demonstration of certain basic communication techniques like AM. and FM. | PO1 PO2 PO3 PO4 | R, U, AP, AN, E |

TY BSC :: Sem-- 5

Paper Title :: Mathematical methods in physics and Thermal statistical physics

Paper Code :: USPH501

|  |  |  |  |
| --- | --- | --- | --- |
| Course outcome | On completing the course the student will be able to…. | PO attended | Cognitive level |
| CO1 | Understand and learn the mathematical techniques to solve various physical phenomena using theory of probability distribution function/ exponential functions, complex functions. | PO1 PO2 PO3 | R, U, AP, AN |
| CO2 | Understand functions of complex variable /differential equations with some applications using simple methods/ tools to solve numericals in physics quantitatively. | PO1 PO2 PO3 | R,U, AP, AN |
| CO3 | Statistical mechanics introduce various distribution functions to thermodynamic systems | PO1 PO2 PO3 | R, U, AP, AN |
| CO4 | Understand Maxwell- Boltzmann, Bose -Einstein statistics and the basic difference between the statistics classical and Quantum theory. | PO1 PO2 PO3 | R, U, AP, AN |

TY BSc :: Sem-- 5

Paper Title :: Solid State Physics.

Paper Code :: USPH502

|  |  |  |  |
| --- | --- | --- | --- |
| Course outcome | On completing the course the student will be able to ….. | PO attended | Cognitive level |
| CO1 | Understand the basic crystallography , various crystal structures and their characteristics with number of solving problems using 2D and 3D- models. | PO1 PO2 PO3 | R, U, AP, AN |
| CO2 | Understand electrical /thermal properties of metals on the basis of classical and Quantum theory. Their merits / demerits. | PO1 PO2 PO3 | R,U, AP, AN |
| CO3 | Understand the basic concepts of Fermi energy, probability distribution function band theory of solids and conduction in semiconductors. | PO1 PO2 PO3 | R,U, AP, AN |
| CO4 | Application in designing diode understanding diode theory, superconducting nature of solid materials and solving various quantitative and qualitative problems and application in practicals. | PO1 PO2 PO3 PO4 | R, U, AP, AN, E |

TYBSC :: Sem--5

Paper Title :: Atomic and Molecular Physics.

Paper Code :: USPH503

|  |  |  |  |
| --- | --- | --- | --- |
| Course outcome | On completion of this course student will be able to …. | PO attended | Cognitive level |
| CO1 | Understand the theory of quantum mechanics application of Schrodinger equation for hydrogen model and its spin magnetic properties. | PO1 PO2 PO3 | R, U, AP, AN |
| CO2 | Learn through the vector - Atom model to understand electrons spin symmetry a symmetry using Classical and Quantum theory. | PO1 PO2 PO3 | R, U, AP, AN |
| CO3 | Learn molecular spectra, IR, microwave spectra and various spectroscopic devices. | PO1 PO2 PO3 | R, U, AP, AN |
| CO4 | Classical and Quantum theory of Raman spectra ESR & MSR theory, principle ,construction and working of various instruments and applications. | PO1 PO2 PO3 | R, U, AP, AN |

TYBSC :: Sem-- 5

Paper Title :: Electrodynamics

Paper Code:: USPH504

|  |  |  |  |
| --- | --- | --- | --- |
| Course outcome | On completion of this course student will be able to …….. | PO attended | Cognitive level |
| CO1 | Understand the concepts of electric charge, potential, field, energy, application of coulomb's law and gauss law to determine flux, potential, boundary conditions theorem and applications. | PO1 PO2 PO3 | R, U, AP, AN |
| CO2 | Understand dipole, polarization in electric field, divergence and curl of electric and magnetic field properties of matter and application | PO1 PO2 PO3 | R, U, AP, AN |
| CO3 | Apply divergence / curl of electromagnetic fields for steady and varying currents Maxwell’s equations, energy in magnetic field. Application to solenoid, Toroid, Helmholtz coil | PO1 PO2 PO3 | R, U, AP, AN |
| CO4 | Understand the violation of Newton's third law, conservation of momentum, concept of electric field and magnetic field. Propagation, reflection, transmission in linear media and conductors. Application in terms of solving examples. | PO1 PO2 PO3 | R, U, AP, AN |

TYBSc :: Sem – 5

Paper Title :: Electronic Instrumentation- 1

Paper Code :: USACEI501

|  |  |  |  |
| --- | --- | --- | --- |
| Course outcome | On completion of this course student will be able to…… | PO attended | Cognitive level |
| CO1 | Learn the different transdusers, sensors etc. Understand the difference between them, gain the knowledge about the elements of optoelectronic devices for display devices and communication. | PO1 PO2 PO3 PO4 | R, U, AP, AN |
| CO2 | Learn and understand working of different microphones loudspeakers and switching regulators and handling of the measuring instruments like CRO. Theory / Practical. | PO1 PO2 PO3 PO4 | R, U, AP, AN |
| CO3 | Student acquires knowledge to convert digital and analogue systems, learn how the data signal is exist, process for different electronic purposes. | PO1 PO2 PO3 PO4 | R, U, AP, AN |
| CO4 | Learn and understand working/ principle of different medical instruments like ECG, EEG, MRI , CT- scan. Learn good knowledge of PCB designing and its architecture with various applications and working of micro oven appliances. | PO1 PO2 PO3 | R, U, AP, AN |

TYBSC :: Sem-- 6

Paper Title :: Classical Mechanics

Paper Code :: USPH601

|  |  |  |  |
| --- | --- | --- | --- |
| Course outcome | On completion of this course student will be able to…. | PO attended | Cognitive level |
| CO1 | Understand the different aspects and laws of motion under the central force in different coordinates systems and related applications. | PO1 PO2 PO3 | R, U, AP, AN |
| CO2 | Understand the need of Lagrange's equation using De'Alembart's principle and illustrative problems, solving techniques. | PO1 PO2 PO3 | R, U, AP, AN |
| CO3 | Understand the simple concepts in fluid mechanics and understand the rigid body dynamics, equations of motion of a rigid body. | PO1 PO2 PO3 | R, U, AP, AN |
| CO4 | Understand theory of nonlinear mechanics to know the irregularity around us in nature chaos. | PO1 PO2 PO3 | R, U, AP, AN |

TY BSc :: Sem-- 6

Paper Title :: Electronics.

Paper Code :: USPH602

|  |  |  |  |
| --- | --- | --- | --- |
| Course outcome | On completion of this course student will be able to……. | PO attended | Cognitive level |
| CO1 | Understand the basics of semiconductor devices and their applications, knowledge on devices like JFET, MOSFET, SCR, UJT and their applications in practical skills. | PO1 PO2 PO3 PO4 | R, U, AP, AN, E |
| CO2 | Understand basic concept of operation of amplifiers & their applications as active filters, instrumentation amplifier and study of design of filters in the practical. | PO1 PO2 PO3 PO4 | R, U AP AN E |
| CO3 | Understand timing concepts and apply for design of multivibrators, timers, oscillators their applications in communication techniques. Working examples and circuit designing in practicals. | PO1 PO2 PO3 PO4 | R, U, AP, AN, E |
| CO4 | Understand digital logic gate families construction of basic building blocks quantitative study of TTL- circuits. | PO1 PO2 PO3 PO4 | R, U, AP, AN, E |

TY BSc :: Sem-- 6

Paper Title :: Nuclear physics

Paper Code : USPH603

|  |  |  |  |
| --- | --- | --- | --- |
| Course outcome | On completion of this course student will be able to… | PO attended | Cognitive level |
| CO1 | Understand fundamentals of nucleus classical and particle physics, decay modes -- alpha beta decay | PO1 PO2 PO3 | R, U, AP, AN |
| CO2 | Understand the theory and development of nuclear models quantitative and qualitative with alpha, beta and gamma- decay process. | PO1 PO2 PO3 | R, U, AP, AN |
| CO3 | Study of particle accelerators and energy generation through nuclear fusion and fission reactions. Theory of nuclear reactor. | PO1 PO2 PO3 | R, U, AP, AN |
| CO4 | Understand the fundamental elementary particles and nuclear forces quantitative theory. | PO1 PO2 PO3 | R, U, AP, AN |

TY BSc:: Sem--6

Paper Title :: Theory of Relativity.

Paper Code :: USPH604

|  |  |  |  |
| --- | --- | --- | --- |
| Course outcome | On completion of this course student will be able to…. | PO attended | Cognitive level |
| CO1 | Understand the essence of special theory of relativity Michelson experiment and relativistic kinematics with substantial numerical problems and transformation equations. | PO1 PO2 PO3 | R, U, AP, AN |
| CO2 | Understand the relativistic kinematics- 2 and geometric representation of space- time. Relative concepts of transformation equations to solve equations of motion relativistically. | PO1 PO2 PO3 | R, U, AP, AN |
| CO3 | Mechanics and relativity through energy, mass, momentum, force and their relative transformation equations. Relative dynamics of a single particle. | PO1 PO2 PO3 | R, U, AP, AN |
| CO4 | Understand the interdependence of electric and magnetic fields and Maxwell’s- equations and related transformation equations for electric and magnetic field. | PO1 PO2 PO3 | R, U, AP, AN |

TY BSc:: Sem--6

Paper Title : Electronic Instrumentation- 2

|  |  |  |  |
| --- | --- | --- | --- |
| Course outcome | Completion of this school student will be able to…. | PO attended | Cognitive level |
| CO1 | Learn and understand code conversion Boolean algebra/ k- map, the working and differences between encoder, decoder, multiplexers. The multiplexers used and construction in the electronics circuits., | PO1 PO2 PO3 PO4 | R, U, AP, AN, E |
| CO2 | Understand advanced microprocessor programming using stack and sub routine instructions and make good programs, execute them. Understand microprocessor interface with 8255 PPI. | PO1 PO2 PO3 PO4 | R, U, AP, AN, E |
| CO3 | Learn the architecture and programming with their different instruction, sets of Microcontroller- 8051. Learn the interfacing with different electronics devices. | PO1 PO2 PO3 PO4 | R, U, AP, AN, E |
| CO4 | To learn and gain the knowledge of C++ programming with their different functions and lodge looping to programs in physics and mathematics. | PO1 PO2 PO3 PO4 | R, U, AP, AN, E |

Paper Code :: USACEI601