Program outcomes, program specific outcomes and course outcomes of Physics Department

|  |  |
| --- | --- |
| Subject specific outcomes | * Students gain knowledge and skill in Physics.
* Apply the knowledge and perform various experiments based on the knowledge of physics.
* Analyze Newtonian mechanics, Dynamics of rigid body, various properties of matter like elasticity, viscosity, surface tension.
* Understands the oscillatory motion, special theory of relativity, electrostatics, magneto-statics, thermodynamics and light phenomenon like interference of light, diffraction, polarization their role in various technological instrumentations.
* Understand the failure of classical physics in some modern experiments and development of quantum mechanics.
* Gain knowledge of crystal structures, radioactivity, nuclear physics and classical and quantum statistics.
* Understands the role of LASER, X-ray and radioactive rays in the field of medical science.
* Understand the role of semiconductor devices in electronic, digital and computer industry.
 |
| Program specific outcomes | * Understand the basic concepts of Newton’s laws, Center of mass, Moment of Inertia, Momentum, Energy, Rotational motion, Lorentz transformations, gravitation, Oscillations, frequency, wavelength, surface tension, Viscous force, Modulii of Elasticity, Kinetic theory of gases, heat engine and efficiency, Laws of thermodynamic, Black body radiation, M-B, B-E and F-D statics, Schrodinger equation, wave packets, applications of Schrodinger equation, atomic model and stability, Natural and artificial radioactivity, use of isotope for various applications, Fission and fusion phenomenon, Nuclear reactions, dielectric and magnetic properties of matter and solid state physics.
* Perform procedures as per laboratory standards in the areas of Gravitation, modulus of rigidity, Surface tension, heat and energy, semiconductor device, probability distributions, spectroscopy, planks law, hydrogen spectra, crystal structure parameters and prism spectra, resolving power dispersive power, Brewster’s law etc.
* Understand the applications of X-ray, radioactive isotopes, LASER beam and semiconductor device, in Agriculture, Medicine, electronic industry and computer technology.
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**Gondwana University, Gadchiroli**

**CBCS courses in B. Sc. Physics**

**Semester - I**

|  |  |  |  |
| --- | --- | --- | --- |
| **Paper Code** | **Core Paper** | **Title of the Paper** | **CREDIT** |
| USPHT01 | I | Mechanics and Relativity | 02 |
| USPHT02 | II | gRAVITATION, oSCILLATION AND PROPERTIES OF MATTER | 02 |
| USPHP01 | PRACTICAL | CORE COURSE I & II | 02 |

**Semester - II**

|  |  |  |  |
| --- | --- | --- | --- |
| **Paper Code** | **Core Paper** | **Title of the Paper** | **CREDIT** |
| USPHT03 | III | VECTOR ANALYSIS AND ELECTROSTATICS | 02 |
| USPHT04 | IV | MAGNETOSTAICS AND ELECTROMAGNETIC WAVES  | 02 |
| USPHP02 | PRACTICAL | CORE COURSE III & IV | 02 |

**Semester- III**

|  |  |  |  |
| --- | --- | --- | --- |
| **Paper Code** | **Core Paper**  | **Title of the Paper** | **CREDIT** |
| USPHT05 | V | THERMAL PHYSICS | 02 |
| USPHT06 | VI | RADIATION AND STATISTICAL PHYSICS | 02 |
| USPHP03 | PRACTICAL | CORE COURSE V & VI | 02 |

**Semester- IV**

|  |  |  |  |
| --- | --- | --- | --- |
| **Paper CODE** | **CORE Paper**  | **Title of the Paper** | **CREDIT** |
| USPHT07 | VII | WAVES, ACOUSTICS AND LASER | 02 |
| USPHT08 | VIII | OPTICAL PHYSICS | 02 |
| USPHP04 | PRACTICAL | CORE COURSE VII & VIII | 02 |

**Semester -V**

|  |  |  |  |
| --- | --- | --- | --- |
| **Paper CODE** | **CORE Paper**  | **Title of the Paper** | **CREDIT** |
| USPHT09 | ANY TWO | ELEMENTS OF MODERN PHYSICS | 02 |
| USPHT10 | SOLID STATE PHYSICS | 02 |
| USPHT11 | MEDICAL PHYSICS | 02 |
| USPHT12 | MATHEMATICAL PHYSICS | 02 |
| USPHP05 | PRACTICAL | CORE COURSE  | 02 |

**Semester -VI**

|  |  |  |  |
| --- | --- | --- | --- |
| **Paper CODE** | **CORE Paper**  | **Title of the Paper** | **CREDIT** |
| USPHT13 | ANY TWO | NUCLEAR AND PARTICLE PHYSICS | 02 |
| USPHT14 | DIGITAL AND ANOLOG CIRCUITS AND INSTRUMENTATION | 02 |
| USPHT15 | QUANTUM MECHANIC | 02 |
| USPHT16 | EMBEDDED SYSTEM- INTRODUCTION TO MICROCONTROLLERS | 02 |
| USCZOP06 | PRACTICAL | CORE COURSE  | 02 |

**Scheme of Marks of Theory and Practical**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Semester** | **Paper** | **Title** | **Marks** | **Total** |
| **Theory** | **Internal Assessment** |
| I | I | Mechanics and Relativity | 50 | 10 | 150 |
| II | gRAVITATION, oSCILLATION AND PROPERTIES OF MATTER | 50 | 10 |
| Practical | Core course I and II practical based on paper I and paper II | 30 | - |
| II | I | VECTOR ANALYSIS AND ELECTROSTATICS | 50 | 10 | 150 |
| II | MAGNETOSTAICS AND ELECTROMAGNETIC WAVES  | 50 | 10 |
| Practical | practical based on above papers I and paper II | 30 | - |
| III | I | THERMAL PHYSICS | 50 | 10 | 150 |
|  |  |  |  |
|  |  |  |  |
| II | RADIATION AND STATISTICAL PHYSICS | 50 | 10 |
| Practical | practical based on above papers I and paper II | 30 | - |
| IV | I | WAVES, ACOUSTICS AND LASER | 50 | 10 | 150 |
| II | OPTICAL PHYSICS | 50 | 10 |
| Practical | practical based on above papers I and paper II | 30 | - |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| V | I | ELEMENTS OF MODERN PHYSICS | 50 | 10 | 150 |
| II | SOLID STATE PHYSICS | 50 | 10 |
| Practical | practical based on above papers I and paper II | 30 | - |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| VI | I | NUCLEAR AND PARTICLE PHYSICS | 50 | 10 | 150 |
| II | DIGITAL AND ANOLOG CIRCUITS AND INSTRUMENTATION | 50 | 10 |
| Practical | practical based on above papers I and paper II | 30 | - |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

**Course Specific out comes**

**B.Sc. I**

**Semester – I**

|  |  |  |  |
| --- | --- | --- | --- |
| **Paper Code** | **Core Paper** | **Title of the Paper** | **Course specific outcomes** |
| USPHT01 | I | Mechanics and Relativity | * Describe Inertial and non-inertial frame of reference and Newton’s laws of motion.
* Describe center of mass, linear momentum and equation of center of mass.
* Gives idea of work, energy and collision.
* Describe moment of inertia, rigid dynamics and Einstein’s special theory of relativity.
 |
| USPHT02 | II | gRAVITATION, oSCILLATION AND PROPERTIES OF MATTER | * Describe Gravitational laws, and free, damped and forced oscillations.
* Material properties such as elasticity, viscosity and surface tension
* Modulii of elasticity were interrelated
 |
| USPHP01 | PRACTICAL | Practical based on above papers  | * Experiments based on gravitation, acceleration due to gravity, elasticity, viscosity.
 |

**SEMESTER –II**

|  |  |  |  |
| --- | --- | --- | --- |
| **Paper Code** | **Core Paper** | **Title of the Paper** | **Course specific outcomes At the end of course students will able to understand**  |
| USPHT03 | III | VECTOR ANALYSIS AND ELECTROSTATICS | * Describe mathematical formulation useful to understand physical properties such as vectors, scalars, gradient, divergence, curl, and surface and volume integration.
* Electrostatics, dipole and qudrapole moments, Gauss law, capacitance, dielectric measurements and other related terms
 |
| USPHT04 | IV | MAGNETOSTAICS AND ELECTROMAGNETIC WAVES  | * Describes important physics of Magneto statics, Biot-Savert law, magnetic field, magnetic intensity , Kirchhoff’s law, magnetic induction
* Understand Maxwell’s relation for electromagnetic wave, their propagation in vacuum and other medium.
* Current in LR, CR, LCR circuits, the rise and decay of current, various electric bridges
 |
| USPHP02 | PRACTICAL | practical based on above papers  | * Experiments based on electric circuits, Electric Bridges, Various theorem, impedances, and measurements of dielectric constant.
 |

**B. Sc. II**

**Semester III**

|  |  |  |  |
| --- | --- | --- | --- |
| **Paper Code** | **Core Paper**  | **Title of the Paper** | **Course specific outcomes At the end of course students will able to understand** |
| USPHT05 | V | THERMAL PHYSICS | * Imparts conceptual knowledge of kinetic theory of gases, mean free path and derivation, effect of temperature and pressure, transport phenomenon.
* Laws of thermodynamics: zeroth, first, second, Carnot cycle and efficiency of Heat engine.
* Various energy function, latent heat, free energy, Enthalpy, entropy, Gibb’s free energy and thermodynamic effects like Thomson effect, Latent heat equations, etc.
 |
| USPHT06 | VI | RADIATION AND STATISTICAL PHYSICS | * Understand phenomenon of Black body radiation and various radiation laws such as Wiens law, Rayleigh-Jeans law, Stefan’s law, Plank’s law.
* Space, phase phase, Maxwell’s Boltzmann distribution and probability laws.
* Quantum mechanical probability laws such as Bose-Einstein, Fermi-Dirac etc.
 |
| USPHP03 | PRACTICAL | Practical based on above papers | * Practical on heat and radiation laws.
 |

Semester IV

|  |  |  |  |
| --- | --- | --- | --- |
| **Paper Code** | **Core Paper**  | **Title of the Paper** | **Course specific outcomes At the end of course students will able to understand** |
| USPHT07 | VII | WAVES, ACOUSTICS AND LASER | * Gains knowledge about superposition two harmonic oscillators and their result as a Lissajous figures at different frequencies and phases, phase velocity and group velocity etc.
* Understood acoustic waves, noise and intensity of loudness to gain the knowledge of design of acoustic hall and auditorium.
* Production and theory of LASER
 |
| USPHT08 | VIII | OPTICAL PHYSICS | * Seeks to understand the light phenomenon such as interference of light, Diffraction and polarization.
* Understood the theoretical formalism of Newtons rings, Michelson’s rings and Fizeu’s fringes.
* Understood the construction concepts of prism, grating, double prism and nicol’s prism.
 |
| USPHP04 | PRACTICAL | Practical based on above papers  | * Practical on sound, Lissajous figures and light phenomenon.
 |

**B. Sc. III**

**Semester V**

|  |  |  |  |
| --- | --- | --- | --- |
| **Paper Code** | **Core Paper**  | **Title of the Paper** | **Course specific outcomes At the end of course students will able to understand** |
| USPHT09 | opted as a core paper  | ELEMENTS OF MODERN PHYSICS | * Gives experimental evidence of failure of classical theory and development of quantum theory
* Representation of matter wave in the form of wave packet.
* Derivation Schrödinger equation and applications for various potential are discussed.
* Radioactivity concepts and decay process.
* Understood fission and fusion process.
 |
| USPHT10 | opted as a core paper | SOLID STATE PHYSICS | * Understanding of crystal structures, diffraction by lattice and determination of lattice parameter.
* Understanding of fundamental dia, para and ferromagnetic materials, and dielectric properties of solids.
* Elementary band theory of solids and superconductivity concepts.
 |
| USPHP05 | PRACTICAL | Practical based on above papers | * Practical on solid state physics and crystallography.
 |

B.Sc. III Semester VI

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| --- | --- | --- | --- |
| **Paper Code** | **Core Paper**  | **Title of the Paper** | **Course specific outcomes At the end of course students will able to understand** |
| USPHT13 | opted as a core paper | NUCLEAR AND PARTICLE PHYSICS | * Gives knowledge related to the nuclear models, exoergic and endoergic reaction, interaction of nuclear radiation with matter, Cerenkov radiations.
* Practical accelerators, and various counters
 |
| USPHT14 | opted as a core paper | DIGITAL AND ANOLOG CIRCUITS AND INSTRUMENTATION | * Digital logic gates, logic circuits, various Booleans laws, and adders.
* Semiconductors, power supply, transistors, amplifiers, IC’s, operational amplifiers and applications for various operations
 |
| USPHP06 | PRACTICAL | Practical based on above papers | * Practical on digital and solid state electronics.
 |