



**SHRI GOVINDRAOMUNGHATE COLLEGE ARTS AND SCIENCE COLLEGE  
KURKHEDA**

Dist- Gadchiroli-441209

**PROGRAMME: B. SC.**

**Programme Outcomes (POs) of B. Sc**

- P01. Disciplinary knowledge:** Students will possess a breadth and depth of disciplinary knowledge in the field of Science.
- P02. Scientific Judgment, Critical Thinking & Research:** Students will be able to analyze information objectively and make a reasoned judgment by observation, understanding and evaluation of sources, such as data, facts and link research findings to innovation and entrepreneurship.
- P03. Problem solving & Analytical Skills:** Students will be able to think logically, analyze situations and solve problems skillfully.
- P04. Environment and sustainability:** Ability to understand the issues related to environmental contexts and sustainable development
- P05. Effective Communication:** Students will be able to present ideas clearly and confidently with skills to convey with others. They will be able to evaluate primary literature, in oral and written form during seminar delivery and subsequently articulate the information.
- P06. Digital Literacy:** Acquire ability to use ICT, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.
- P07. Leadership & Team work:** Ability to work as a leader as well as in a team for group projects, field work and group activities and participate actively, in a healthy spirit
- P08. Ethical & Moral values:** Students will bear the core characters of honesty, integrity and commitment and imbibe qualities of empathy for fellow human beings.
- P09. Effective Citizenship and Social Interaction:** Students will develop tolerance and harmony towards cultural, regional, linguistic, communal, socioeconomic and other diversities and respect for national symbols of pride
- P010 Technological Upliftment:** Students will learn how to handle equipment and machines used for practical purpose in this programme. This is useful for them to choose their future education and area of expertise as a career.

## PROGRAMME SPECIFIC OUTCOMES (PSOs)

### B.Sc: Physics, Chemistry, Mathematics (P.C.M) OUTCOMES

By the end of this programme, the students will be able to:

**PSO 1:** Understand the theoretical concepts of physical and chemical properties of materials and the role of mathematics in dealing with them in a quantitative way.

**PSO 2:** Analyse the concepts of mathematics, physics and chemistry and understand the relation among them like physical chemistry, mathematical modelling of physics and chemistry problems.

Skills needed to handle instruments and adopt lab procedures to study physical chemical properties of materials.

**PSO 3:** Mathematical, numerical techniques required to model them.

**PSO 4:** Ability to interlink the skills and knowledge in mathematics, physics and chemistry and develop an aptitude to address the problems in biophysics, stock market analysis.

### B.Sc: Physics, Computer Science, Mathematics, (P.Cs.M) OUTCOMES

By the end of this programme, the students will be able to:

**PSO 1:** Understand the concepts of vector spaces, group theory, quantum mechanics, optical, thermal, electrical, mechanical properties of a materials, probability, algorithm design, data base

**PSO 2:** Analyze the concepts of mathematics, physics and computers science able to relate them in numerical programming of models of physical systems.

**PSO 3:** Acquire the skills to study the properties of materials, implementation of numerical algorithms by using various

**PSO 4:** Ability to interlink the skills developed and acquires an aptitude to address the problems in simulations of material properties, web and mobile app development.

### B.Sc., Electronics, Computer Science, Mathematics (E.Cs.M.) OUTCOMES

By the end of this programme, the students will be able to:

**PSO 1:** Understand the concepts of basic electronic components, networks, communication systems, microprocessors and microcontrollers, algorithms, C language, Arduino programming, Networking, cloud and Big Data.

**PSO 2:**Analyse the concepts of mathematics, Electronics and computer Networks and able to use them in solving real world problems.

**PSO 3:** Acquire the skills to use various electronic microcontroller, Arduino, Raspberry PI and simulators.

**PSO 4:** Ability to interlink the skills developed and gets an aptitude to address the problems in smart home design, smart vehicles, smart sensors in various fields.

### **B.Sc., Physics , Electronics, Mathematics (P.E.M.) OUTCOMES**

By the end of this programme, the students will be able to:

**POS 1:**Understand the basic concepts of electronics components, network theorem,digital electronics, solid state semiconductor devices, amplifier theory,Analog and Digital circuits, basic circuits, design using circuit makersoftware and their application

**POS 2:** Analyze different parameters of various circuits

**POS 3:**Understand the use of electronics in the field of computer science.

**POS 4:**Perform and testing of different electronics components and circuits.

**POS 5:**Analyze the I/P, O/P V-I characteristics of the circuits.

**POS 6:** Understand the application of Electronics in domestic appliances

**POS 7:** Analyze the relationship between analogue and digital circuits.

**POS 8:**Repair small household electrical and electronics appliances

### **COURSE OUTCOME (COs) FOR SUBJECT: PHYSICS**

<b>Course Code</b>	<b>Course Title</b>	<b>Course Outcomes</b>
<b>USPHT01</b>	<b>MECHANICS AND RELATIVITY</b>	<b>Aim: To make the students understand the basic concepts of Mechanics and Relativity as core part of the subject.</b>  After completing of the course, the students will be able to-  CO1: Application of Newton's laws of motion to solve various problems related to day today life.  CO2: understand the Law of Conservation of Linear

		<p>Momentum and Angular Momentum and apply these laws to understand elastic and inelastic collision, motion of a rocket.</p> <p>CO3: Study the behaviour of rigid body dynamics.</p> <p>CO4: Formulate the Mathematical Relations based on Physical Phenomenon.</p> <p>CO5: The students shall be familiar with the fundamental principles of the general theory of relativity. They shall know the meaning of basic concepts like the equivalence principles and inertial frames.</p> <p>CO6: Understand the negative result of michelsonmorley experiment , galilean and Lorentz transformation</p> <p>CO7: Concept of relativity, length contraction, relativistic mass, time dilation.</p>
<p><b>USPHT02</b></p>	<p><b>Gravitation, Oscillation and Properties of Matter</b></p>	<p><b>Aim: Students should understand the concept related with Gravitation and Properties of Matter.</b></p> <p>After completing the course, the students will be able to-</p> <p>CO1: Understand Newton's Law of Gravitation.</p> <p>CO2: Understand the Motion of a particle in a central force field, conservation of angular momentum, Gravitational Field and Gravitational potential.</p> <p>CO3: understand Kepler's law, Geosynchronous satellite and orbits and Basic idea of global positioning system (GPS)</p> <p>CO4: Simple harmonic motion is one of the fundamental types of motion that exists in nature. This course is to cover the fundamental physical concepts of Simple harmonic motion and waves</p> <p>CO5: Set and solve the equation of motion for damped and Forced harmonic oscillators and analyse the nature of oscillations.</p> <p>CO6: Study the elastic behaviour and working of torsional pendulum.</p> <p>CO7: To enable students to learn and to apply the basic concepts of properties of matter in day to day life.</p> <p>CO8: Concept of viscosity of fluids, Bernoulli's</p>

		Equation and its applications.
<b>USPHP01</b>	<b>Practical</b>	After completing the course, the students will be able to- CO1: To understand theories behind the experiments. CO2: Make a set up carry out practical's independently.

## SEMESTER II

<b>Course Code</b>	<b>Course Title</b>	<b>Course Outcomes</b>
<b>USPHT03</b>	<b>Vector Analysis and Electrostatics</b>	<p><b>Aim: To make the students understand the basic concepts vectors and vector analysis and its applications in electrostatics as core part of the subject.</b></p> <p>After completing the course, the students will be able to-</p> <p>CO1: Define concepts of point and vector and explain differences and similarities between them.</p> <p>CO2: Perform the basic algebra operation of vectors.</p> <p>CO3: Understand the gradient of scalar field and the divergence and rotation of vector field, and calculate those values. Solve practical problems using the integral theorems of vector field (Gauss theorem, Stokes theorem, etc.).</p> <p>CO4: The students should have attained a common level in basics of Electrostatics.</p> <p>CO5: Students will be able to understand the concept of the electric force, electric field intensity and electric potential. They are able to calculate torque on a dipole on a uniform electric field, Expression for Potential energy of an electric dipole in a uniform electric field.</p> <p>CO6: To understand Coulombs law and Gauss law in details.</p> <p>CO7: Student will understand the dielectric phenomenon and effect of electric field on dielectric.</p>
<b>USPHT04</b>	<b>Magnetostatics and Electromagnetic Waves</b>	<p><b>Aim : To make the students understand the basic concepts of Magnetostatics and Electromagnetic Waves as core part of the subject.</b></p>

		<p>After completing the course, the students will be able to-</p> <p>CO1: The students should have attained a common level in basics of Magnetostatics.</p> <p>CO2: Study the concept of magnetic field, magnetic field for steady currents using Biot-Savart's and Ampere's Circuital laws.</p> <p>CO3: Student will understand the Magnetic properties of materials</p> <p>CO4: Establish the link between electrostatics and magnetostatics using Maxwell's equations</p> <p>CO5: Develop the wave equation for propagation of electromagnetic waves through material media and vacuum at different angles of incidence.</p>
<b>USPHP02</b>	<b>Practical</b>	<p>After completing the course, the students will be able to-</p> <p>CO1: To understand theories behind the experiments.</p> <p>CO2: Make a set up carry out practical's independently</p>

### **SEMESTER III**

<b>Course Code</b>	<b>Course Title</b>	<b>Course Outcomes</b>
<b>USPHT05</b>	<b>THERMAL PHYSICS</b>	<p><b>Aim: To make the students to understand the basic concepts of Thermal physics as core part of the subject.</b></p> <p>After completing the course, the students will be able to-</p> <p>CO1: To express the relationship between the pressure and the average kinetic energy of gas molecules in the form of equation.</p> <p>CO2: To express the five basic assumptions of the Kinetic Molecular Theory of Gases.</p> <p>CO3: Understood mean free path and transport phenomenon of gas.</p> <p>CO4: Study of Van der waal's equation and constants of it.</p> <p>CO5: The students should have attained a common level</p>

		<p>in basics of Thermodynamics.</p> <p>CO6: The course makes the students able to understand the basic physics of heat and temperature and their relation with energy, work, radiation and matter.</p> <p>CO7: The students also learn how laws of thermodynamics are used in a heat engine to transform heat into work.</p> <p>CO8: To understand various thermodynamic processes like isothermal, isobaric, isochoric processes and laws of thermodynamics.</p> <p>CO9: To understand Carnot's cycle, Heat engines and Refrigerators.</p> <p>CO10: Understood property entropy and derive some thermodynamically relations using entropy concept.</p> <p>CO11: Learn the basic concepts of the thermodynamic potentials and their physical interpretations. They are also expected to learn Maxwell's thermodynamic relations.</p>
<b>USPHT06</b>	<b>RADIATION AND STATISTICAL PHYSICS</b>	<p><b>Aim: To make the students to understand the Thermal radiation laws and basic concepts of statistical analysis and as core part of the subject.</b></p> <p>After completing the course, the students will be able to-</p> <p>CO1: To study the Black body radiations and phenomenon related to it</p> <p>CO2: To study the Probability concept in details and study Maxwell Boltzmann law.</p> <p>CO3:To understand basic concepts of probability distribution &amp; specification of the state of the system (classical &amp; quantum)</p> <p>CO4: Understand Bose-Einsteins and Fermi- Dirac Principle.</p>
<b>USPHP03</b>	<b>Practical</b>	<p>After completing the course, the students will be able to-</p> <p>CO1: To understand theories behind the experiments.</p>

		CO2: Make a set up carry out practical's independently
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### SEMESTER IV

Course Code	Course Title	Course Outcomes
USPHT07	<b>WAVES, ACOUSTICS &amp; LASER</b>	<p><b>Aim: To make the students to understand the basic concepts Sound Waves, Acoustics and Laser as core part of the subject.</b></p> <p>After completing the course, the students will be able to-</p> <p>CO1: Simple harmonic motion is one of the fundamental types of motion that exists in nature. This course is to cover the fundamental physical concepts of Simple harmonic motion and waves.</p> <p>CO2: Explain how superposition of waves leads to different Lissajous figures.</p> <p>CO3: This course will provide knowledge on the applications of ultrasonics</p> <p>CO4: Sound gives knowledge or reverberation of hall, echoes and will helpful for the construction of good acoustical condition of hall.</p> <p>CO5: Understand the spontaneous and stimulated emission of radiation, optical pumping and population inversion. Three level and four level lasers. Ruby laser and He-Ne laser in details. Basic lasing.</p> <p>CO6: This course will provide knowledge on the applications of Lasers</p>
USPHT08	<b>OPTICAL PHYSICS</b>	<p><b>Aim: To make the students to understand the basic concepts of Light Waves and properties of light waves as core part of the subject.</b></p> <p>After completing the course, the students will be able to-</p> <p>CO1: Solve numerical problems based on interference in thin films</p> <p>CO2: Derive conditions for Fresnel class diffraction and Fraunhofer class diffraction. Solve numerical problems based on diffraction grating, resolving power of telescope and prism</p>



		<p>CO3: Apply Huygen's theory of double refraction to study the types of crystal</p> <p>CO4: Analyze the types of polarized light with help of Nicol Prism and retardation plate</p>
<b>USPHP04</b>	<b>Practicals</b>	<p>After completing the course, the students will be able to-</p> <p>CO1: To understand theories behind the experiments.</p> <p>CO2: Make a set up carry out practical's independently</p>

### SEMESTER V

<b>Course Code</b>	<b>Course Title</b>	<b>Course Outcomes</b>
<b>USDSEPHT 09</b>	<b>ELEMENTS OF MODERN PHYSICS</b>	<p>After completing the course, the students will be able to-</p> <p>CO1: Pinpoint the historical aspects of development of quantum mechanics.</p> <p>CO2: Understand and explain the differences between classical and quantum mechanics.</p> <p>CO3: Understand the idea of wave function.</p> <p>CO4: Understand the uncertainty relations</p> <p>CO5: Solve Schrodinger equation for simple potential</p> <p>CO6: This is a basic course in Physics which deals with the phenomena taking place in the nuclear domain. Students will be given an insight into the dimensions of a nucleus.</p> <p>CO7: The aim is to tell them about the stability of nucleus and various other properties.</p> <p>CO8: The students will learn about various types of radiations and their interaction with matter.</p> <p>CO9: The course is such designed to teach students about various types of nuclear reactions and their energetics.</p> <p>CO10: Students will learn the methods to find the mass</p>

		and charge of any nucleus by using some instruments.
<b>USDSEPHT 10</b>	<b>SOLID STATE PHYSICS</b>	<p>After completing the course, the students will be able to-</p> <p>CO1: Describe the difference between crystalline and amorphous materials.</p> <p>CO2: Describe the arrangement of atoms and ions in crystalline structures</p> <p>CO3: Schematically diagram face-centered cubic, body-centered cubic and hexagonal closepacked unit cells.</p> <p>CO4: Recognize and also give the lattice parameter relationships for all seven crystal systems--i.e., cubic, hexagonal, tetragonal, rhombohedral, orthorhombic, monoclinic, and triclinic.</p> <p>CO5: mGiven a unit cell and the Miller indices for a plane, draw the plane represented by these indices referenced to this unit cell.</p> <p>CO6: Given the unit cell for some crystal structure, be able to draw the atomic packing arrangement for a specific crystallographic plane.</p> <p>CO7: Explain the use of X-ray diffraction measurements in determining crystalline structures</p>
<b>USPHP04</b>	<b>Practicals</b>	<p>After completing the course, the students will be able to-</p> <p>CO1: To understand theories behind the experiments.</p> <p>CO2: Make a set up carry out practical's independently</p>

## SEMESTER VI

Course Code	Course Title	Course Outcomes
<b>USSECPH03</b>	<b>BASIC INSTRUMEN TATION SKILLS</b>	<p><b>AIM:This course is to get exposure with various aspects of instruments and their usage through hands-on mode. Experiments listed below are to be done in continuation of the topics.</b></p> <p>After completing the course, the students will be able to-</p> <p>CO1:To use the techniques and skills for electrical projects.</p> <p>CO2:Measurement of Voltage, Current, Power factor, Power, Energy. CO3Ability to balance Bridges to find</p>

		<p>unknown values.</p> <p>CO3: Ability to measure frequency, phase with Oscilloscope.</p> <p>CO4:Ability to use Digital voltmeters</p>
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### Skill Enhancement (Foundation) Courses

<b>SEMESTER V</b>		
Course Code	Course Title	Course Outcomes
USSECPH01	<b>PHYSICS WORKSHOP SKILL</b>	<p><b>AIM: The aim of this course is to enable the students to familiar and experience with various mechanical and electrical tools through hands-on mode.</b></p> <p>After completing the course, the students will be able to-</p> <p>CO1: Learn the use of measurement and dimensional analysis.</p> <p>CO2: Learn basic mechanical skills and use in daily life. Have knowledge of cutting the various metals. Learn about the electrical and electronic skills and use in daily life. Learn the concept of power generation systems.</p>

<b>SEMESTER VI</b>		
Course Code	Course Title	Course Outcomes
USSECPH03	<b>BASIC INSTRUMENTATION SKILLS</b>	<p><b>AIM: This course is to get exposure with various aspects of instruments and their usage through hands-on mode. Experiments listed below are to be done in continuation of the topics.</b></p> <p>After completing the course, the students will be able to-</p> <p>CO1: To use the techniques and skills for electrical projects.</p> <p>CO2: Measurement of Voltage, Current, Power factor, Power, Energy. CO3 Ability to balance Bridges to find unknown values.</p> <p>CO3: Ability to measure frequency, phase with Oscilloscope.</p> <p>CO4: Ability to use Digital voltmeters</p>

