ANDHRA CHRISTIAN COLLEGE: GUNTUR
DEPARTMENT OF PHYSICS

B.SC. (M.P.C. & M.P.CS)

PROGRAMME SPECIFIC OUTCOMES(PSOS)

ANDHRA CHRISTIAN COLLEGE, GUNTUR offers Three Year (comprising 6 semesters) Undergraduate Programme in Mathematics, Physics and Chemistry with objective of empowering students to acquire all-inclusive understanding of Physical Science as an academic discipline. Upon successful completion of B. Sc. MPC and MPCS Degree Programme, the students shall acquire the following skills and competencies.

PSO1	**Understand the theoretical concepts of physical and chemical propertiesof materials and the role of mathematics in dealing with them in a quantitative way.**
PSO2	**Analyze 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.**
PSO3	**Mathematical, numerical techniques required to model them.**
PSO4	**Ability to interlink the skills and knowledge in mathematics, physics andchemistry and develop an aptitude to address the problems encountered in day-to-day life.**

B.SC - MATHEMATICS, PHYSICS, COMPUTER SCIENCE (M.P.CS)
PROGRAMME SPECIFIC OUTCOMES(PSOS)

ANDHRA CHRISTIAN COLLEGE, GUNTUR, offers Three Year (comprising 6 semesters) Undergraduate Programme in Mathematics, Physics and Computer Science with objective of empowering students to acquire all-inclusive understanding of Physical and Computer Science as an academic discipline. Upon successful completion of B. Sc. MPCS Degree Programme, the students shall acquire the following skills and competencies.

PSO1	**Understand the theoretical concepts of physical properties of materialsand the role of mathematics in dealing with them in a quantitative way and related computational techniques.**
PSO2	**Analyze the concepts of Mathematics, Physics and Computer Science and understand the relation among them like Solid state Devices, mathematical modelling of physics and Computational problems. Skills needed to handle instruments and adopt lab procedures to study physical properties of materials and computer simulations.**
PSO3	**Mathematical, numerical techniques required to model them.**
PSO4	**Ability to interlink the skills and knowledge in mathematics, physics andComputer Science and develop an aptitude to address the problems encountered in day-to-day life.**

PHYSICS COURSE OUTCOMES(COS)

Course Code: PHY1SK

Course Name: Mechanics, Waves & Oscillations

Upon completion of this course, the student will be able to:	
CO 1	**Understand Newton's laws of motion and motion of variable masssystem and its application to rocket motion and the concepts of impact parameter, scattering cross section.**
CO 2	**Apply the rotational kinematic relations, the principle and working of gyroscope and it applications and the processional motion of a freelyrotating symmetric top.**
CO 3	**Comprehend the general characteristics of central forces and the application of Kepler's laws to describe the motion of planets andsatellite in circular orbit through the study of law of Gravitation.**
CO 4	**Understand postulates of Special theory of relativity and itsconsequences such as length contraction, time dilation, relativistic mass and mass-energy equivalence.**
CO 5	**Examine phenomena of simple harmonic motion and the distinction between undamped, damped and forced oscillations and the concepts of resonance and quality factor with reference to damped harmonic oscillator.**
CO6	**Appreciate the formulation of the problem of coupled oscillations andsolve them to obtain normal modes of oscillation and their frequencies in simple mechanical systems.**
CO7	**Figure out the formation of harmonics and overtones in a stretchedstring and acquire the knowledge on Ultrasonic waves, their production and detection and their applications in different fields.**
CO8	**Perform experiments on Properties of matter such as the determination of moduli of elasticity viz., Young's modulus, Rigidity modulus ofcertain materials; Surface tension of water, Coefficient of viscosity of a liquid , Moment of inertia of some regular bodies by different methods and compare the experimental values with the standard values.**
CO9	**Know how to determine the acceleration due to gravity at a place using**

	Compound pendulum and Simple pendulum.
CO10	**Notice the difference between flat resonance and sharp resonance in case of volume resonator and sonometer experiments respectively.**
CO11	**Verify the laws of transverse vibrations in a stretched string using sonometer and comment on the relation between frequency, length andtension of a stretched string under vibration.**

Course Code: PHY2SK

Course Name: Wave optics

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Upon completion of this course, the student will be able to:	
CO 1	Understand the phenomenon of interference of light and its formation in (i) Lloyd's single mirror due to division of wave front and (ii) Thin films, Newton's rings and Michelson interferometer due to division of amplitude.
CO 2	Distinguish between Fresnel's diffraction and Fraunhoffer diffraction and observe the diffraction patterns in the case of single slit and the diffraction grating.
CO 3	Describe the construction and working of zone plate and make the comparison of zone plate with convex lens.
CO 4	Explain the various methods of production of plane, circularly and polarized light and their detection and the concept of optical activity.
CO 5	Comprehend the basic principle of laser, the working of He-Ne laser and Ruby lasers and their applications in different fields.
CO6	Explain about the different aberrations in lenses and discuss the methods of minimizing them.
CO7	Understand the basic principles of fiber optic communication and explore the field of Holography and Nonlinear optics and their applications.
CO8	Gain hands-on experience of using various optical instruments like spectrometer, polarimeter and making finer measurements of wavelength of light using Newton Rings experiment, diffraction grating etc.
CO9	Understand the principle of working of polarimeter and the measurement of specific rotatory power of sugar solution
CO10	Know the techniques involved in measuring the resolving power of telescope and dispersive power of the material of the prism.
CO11	Be familiar with the determination of refractive index of liquid by Boy's method and the determination of thickness of a thin wire by wedge method.

Course Code: PHY3SK

Course Name: Heat & Thermodynamics

Upon completion of this course, the student will be able to:	
CO 1	**Understand the basic aspects of kinetic theory of gases, Maxwell-Boltzmann distribution law, equipartition of energies, mean free pathof molecular collisions and the transport phenomenon in ideal gases**
CO 2	**Gain knowledge on the basic concepts of thermodynamics, the first and the second law of thermodynamics, the basic principles of refrigeration, the concept of entropy, the thermodynamic potentials and their physical interpretations.**
CO 3	**Understand the working of Carnot's ideal heat engine, Carnot cycle and its efficiency**
CO 4	**Develop critical understanding of concept of Thermodynamicpotentials, the formulation of Maxwell's equations and its applications.**
CO 5	**Differentiate between principles and methods to produce low temperature and liquefy air and also understand the practical applications of substances at low temperatures.**
CO6	**Examine the nature of black body radiations and the basic theories.**
CO7	**Perform some basic experiments in thermal Physics, viz., determinations of Stefan's constant, coefficient of thermal conductivity, variation of thermo-emf of a thermocouple with temperature difference at its two junctions, calibration of a thermocouple and Specific heat of a liquid.**

Course Code: PHY4SKA

Course Name: Electricity, Magnetism & Electronics

Upon completion of this course, the student will be able to:	
CO 1	**Understand the Gauss law and its application to obtain electric field in different cases and formulate the relationship between electric displacement vector, electric polarization, Susceptibility, Permittivity and Dielectric constant.**
CO 2	**Distinguish between the magnetic effect of electric current and electromagnetic induction and apply the related laws in appropriate circumstances.**
CO 3	**Understand Biota and Savart's law and Ampere's circuital law todescribe and explain the generation of magnetic fields by electrical currents.**
CO 4	**Develop an understanding on the unification of electric and magnetic fields and Maxwell's equations governing electromagnetic waves.**
CO 5	**Phenomenon of resonance in LCR AC-circuits, sharpness ofresonance, Q-factor, Power factor and the comparative study of series and parallel resonant circuits.**
CO6	**Describe the operation of p-n junction diodes, Zener diodes, light emitting diodes and transistors**
CO7	**Understand the operation of basic logic gates and universal gates and their truth tables**
CO8	**Measure the current sensitivity and figure of merit of a moving coil galvanometer.**
CO9	**Observe the resonance condition in LCR series and parallel circuit**
CO10	**Learn how a sonometer can be used to determine the frequency of AC-supply.**
CO11	**Observe the variation of magnetic field along the axis of a circular coil carrying current using Stewart and Gee's apparatus.**
CO12	**Understand the operation of PN junction diode, Zener diode and a transistor and their V-I characteristics.**
CO13	**Construct the basic logic gates, half adder and full adder and verify their truth tables. Further, the student will understand how**

	NANDand NOR gates can be used as universal building blocks

Course Code: PHY4SKB

Course Name: Modern Physics

Upon completion of this course, the student will be able to:	
CO 1	**Develop an understanding on the concepts of Atomic and Modern Physics, basic elementary quantum mechanics and nuclear physics.**
CO 2	**Develop critical understanding of concept of Matter waves and Uncertainty principle.**
CO 3	**Get familiarized with the principles of quantum mechanics and the formulation of Schrodinger wave equation and its applications.**
CO 4	**Examine the basic properties of nuclei, characteristics of nuclear forces, salient features of nuclear models and different nuclear radiation detectors.**
CO 5	**Classify Elementary particles based on their mass, charge, spin, half life and interaction.**
CO6	**Get familiarized with the nano materials, their unique properties and applications.**
CO7	**Increase the awareness and appreciation of superconductors and them practical applications**
CO8	**Measure charge of an electron and /m value of an electron by Thomson method.**
CO9	**Understand how the Planck's constant can be determined using Photocell and LEDs.**
CO10	**Study the absorption of α-rays and β-rays, Range of β-particles and the characteristics of GM counter**
CO11	**Determine the Energy gap of a semiconductor using thermistor and junction diode.**

Course Code: PHY5SCA

Course Name: Electricity, Magnetism & Electronics

Upon completion of this course the student will be able to:	
CO 1	**Understand the Gauss law and its application to obtain electric field in different cases and formulate the relationship between electric displacement vector, electric polarization, Susceptibility, Per activity and Dielectric constant.**
CO 2	**Distinguish between the magnetic effect of electric current and electromagnetic induction and apply the related laws in appropriatecircumstances.**
CO 3	**Understand Biota and Savart's law and Ampere's circuital law todescribe and explain the generation of magnetic fields by electrical currents.**
CO 4	**Develop an understanding on the unification of electric and magnetic fields and Maxwell's equations governing electromagnetic waves.**
CO 5	**Phenomenon of resonance in LCR AC-circuits, sharpness ofresonance, Factor, Power factor and the comparative study of series and parallel resonant circuits.**
CO6	**Describe the operation of p-n junction diodes, Zener diodes, light emitting diodes and transistors**
CO7	**Understand the operation of basic logic gates and universal gates and their truth tables**
CO8	**Measure the current sensitivity and figure of merit of a moving coil galvanometer.**
CO9	**Observe the resonance condition in LCR series and parallel circuit**
CO10	**Learn how a sonometer can be used to determine the frequency of AC-supply.**
CO11	**Observe the variation of magnetic field along the axis of a circular coil carrying current using Stewart and Gee's apparatus.**
CO12	**Understand the operation of PN junction diode, Zener diode and a transistor and their V-I characteristics.**

CO13	**Construct the basic logic gates, half adder and full adder and verifytheir truth tables. Further, the student will understand how NAND and NOR gates can be used as universal building blocks**

Course Code: PHY5SCB

Course Name: Modern Physics

Upon completion of this course the student will be able to:	
CO 1	**Develop an understanding on the concepts of Atomic and Modern Physics, basic elementary quantum mechanics and nuclear physics.**
CO 2	**Develop critical understanding of concept of Matter waves and Uncertainty principle.**
CO 3	**Get familiarized with the principles of quantum mechanics and the formulation of Schrodinger wave equation and its applications.**
CO 4	**Examine the basic properties of nuclei, characteristics of nuclearforces, salient features of nuclear models and different nuclear radiation detectors.**
CO 5	**Classify Elementary particles based on their mass, charge, spin, half life and interaction.**
CO6	**Get familiarized with the nano materials, their unique properties and applications.**
CO7	**Increase the awareness and appreciation of superconductors and their practical applications**
CO8	**Measure charge of an electron and /m value of an electron by Thomson method.**
CO9	**Understand how the Planck's constant can be determined using Photocell and LEDs.**
CO10	**Study the absorption of α-rays and β-rays, Range of β-particles and the characteristics of GM counter**
CO11	**Determine the Energy gap of a semiconductor using thermistor and junction diode.**

Course Code: PHY6SC

Course Name: Renewable Energy (Elective)

Upon completion of this course, the student will be able to:	
CO 1	**The learner will be able to describe the environmental aspects of non-conventional energy sources, in comparison with various conventional energy sources.**
CO 2	**Tell the need of renewable energy sources.**
CO 3	**Describe the use of solar energy in various applications like solar heating, cooling, desalination, dying, cooking and power generation.**
CO 4	**Explain the applications of wind energy using wind turbines. Describe the advantages and disadvantages of Ocean energy.**
CO 5	**Explain the applications of Bio gas plants.**

Course Code : PHY6SC1

Course Name: Solar Thermal & Photovoltaic Aspects (Cluster-C1)

Upon completion of this course, the student will be able to:	
CO 1	**The learner will be able to describe the solar intensity measurement using Angstrom's Pyrheliometer.**
CO 2	**Describe the construction, working and efficiencies of different solar collectors.**
CO 3	**Explain the efficiency, fill factor of a solar cell.**
CO 4	**Analyze the working of Solar PV system.**
CO 5	**Differentiate various thermal applications of solar energy like solar heaters, coolers, dryers, desalinators, cookers, power generators.**

Course Code: PHY6SC2

Course Name: Wind, Hydro and Ocean energies (Cluster-C2)

Upon completion of this course, the student will be able to:	
CO 1	**The student can Identify Winds energy as alternate form of energy and to know how it can be tapped.**
CO 2	**Explain about the various wind energy conversion systems**
CO 3	**Student can able to know various Wind energy applications**
CO 4	**Understand the Ocean thermal, Wave &Tidal energy, its mechanism of production and its applications**
CO 5	**Distinguish the micro, mini and small hydro power systems.**

Course Code: PHY6SC3

Course Name: Energy Storage devices (Cluster-C3)

Upon completion of this course the student will be able to:	
CO 1	**Student able to know about need of energy Storage**
CO 2	**The student can able to differentiate the primary, secondary batteries.**
CO 3	**Explain the various applications of SMES systems, and their performance.**
CO 4	**Discuss the construction and working principle of Fuel Cell and differentiate the different types of fuel cells.**
CO 5	**Describe the various applications of Fuel Cells.**