



KVR, KVR & MKR COLLEGE: KHAJIPALEM
KHAJIPALEM - 522329 , Bapatla District (A.P)
(Re- Accredited by NAAC “B++” Grade With CGPA: 2.81
E-Mail: kvrkvr_mkrcollege@yahoo.co.in , kvrkvrmkrc@gmail.com



DEPARTMENT OF PHYSICS

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

“The study of physics is also an adventure. You will find it challenging, sometimes frustrating, occasionally painful, and often richly rewarding.”

— Hugh D. Young,

SRI ABR GOVERNMENT DEGREE COLLEGE
REPALLE, BAPATLA (DT) – 522 265



On successful completion of Graduate program, graduating students/graduates will be able to

PROGRAMME OUTCOMES (POs)	
PO1	Disciplinary Knowledge 1. Able to show thorough knowledge and grasp more academic subjects included in an undergraduate programme of study.
PO2	Communication Skills 1. Able to communicate ideas and concepts clearly both orally and in writing 2. Able to communicate with others through proper means, express oneself with confidence 3. Display the capacity to listen carefully, read and write analytically, and communicate complex information to various groups in a clear and concise manner.
PO3	Critical Thinking 1. Being able to apply analytical thought to a body of information 2. Being able to analyze and evaluate arguments, assertions, and opinions using empirical data 3. Being able to spot pertinent assumptions or implications and create logical arguments 4. By using a scientific approach to knowledge acquisition, critically analyze practices, policies, and theories.
PO4	Problem Solving 1. Ability to extrapolate from what has been learned and apply one's competences to solve various types of unfamiliar challenges 2. Apply one's learning to real-world circumstances.
PO5	Research related Skills 1. Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyze, interpret, and draw conclusions from data 2. Ability to plan, carry out, and report the results of an experiment or investigation. 3. An inquisitive mindset and the capacity to pose pertinent/ appropriate questions, problematize, synthesize, and articulate.



PO6	Team Work/ Cooperation 1. The ability to facilitate cooperative or coordinated effort on the part of a group, act together as a group or a team in the interests of a common cause, and work effectively as a member of a team
PO7	Digital Literacy Skills 1. Capability to use ICT in a range of learning scenarios 2. Show the ability to access, assess, and utilize a variety of relevant information sources, and use suitable tools for data analysis.
PO8	Self – directed Learning 1. Capacity to manage a project from start to finish, determines the right resources needed for the project, and operates independently.
PO9	Moral & Ethical Awareness 1. Ability to uphold moral/ethical ideals in how one lives, to articulate a viewpoint or argument on an ethical topic from several angles, and to employ ethical practices in all aspects of one's job. 2. Capable of demonstrating the ability to recognize ethical issues that are relevant to one's work, refrain from unethical behavior, respect for environmental and sustainability issues, and taking objective, unbiased, and truthful actions in all facets of one's work.
PO10	Leadership Qualities/ Readiness 1. Ability to plan out the responsibilities of a team or organization, to define direction, to create a team that can help realize the vision, to inspire and motivate team members to connect with that vision 2. To use managerial abilities to smoothly and efficiently lead people to their intended destination



B.SC - MATHEMATICS, PHYSICS, CHEMISTRY (M.P.C) PROGRAMME SPECIFIC OUTCOMES(PSOS)

SABR Government Degree College, Repalle, 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 Degree Programme, the students shall acquire the following skills and competencies.

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

PSOS - POS MAPPING

		POS									
		1	2	3	4	5	6	7	8	9	10
PSOS	1	✓	✓			✓		✓	✓		
	2	✓	✓	✓	✓	✓		✓	✓		
	3	✓	✓	✓	✓	✓	✓	✓	✓		✓
	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓



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Ph: 08643-258745

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

SABR Government Degree College, Repalle, 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 materials and the role of mathematics in dealing with them in a quantitative way and related computational techniques.
PSO2	Analyse 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 and Computer Science and develop an aptitude to address the problems encountered in day to day life.

PSOS - POS MAPPING

		POS									
		1	2	3	4	5	6	7	8	9	10
PSOS	1	✓	✓			✓		✓	✓		
	2	✓	✓	✓	✓	✓		✓	✓		
	3	✓	✓	✓	✓	✓	✓	✓	✓		✓
	4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓



ESTD: 1981

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PHYSICS COURSE OUTCOMES(COS) MAPPING WITH PSOS & POS



Course Code : PHY1SK

Course Name: Mechanics, Waves & Oscillations

Upon completion of this course, the student will be able to:		MPC PSOS	MPCS PSOS	POS
CO 1	Understand Newton's laws of motion and motion of variable mass system and its application to rocket motion and the concepts of impact parameter, scattering cross section.	1,3,4	1,3,4	1,2,3, 7,8
CO 2	Apply the rotational kinematic relations, the principle and working of gyroscope and its applications and the precessional motion of a freely rotating symmetric top.	1,3,4	1,3,4	1,8
CO 3	Comprehend the general characteristics of central forces and the application of Kepler's laws to describe the motion of planets and satellite in circular orbit through the study of law of Gravitation.	1,2,3	1,2,3	1,2,4, 8
CO 4	Understand postulates of Special theory of relativity and its consequences such as length contraction, time dilation, relativistic mass and mass-energy equivalence.	1,3	1,3	1,3,5, 8
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.	1,2,3	1,2,3	1,4,8
CO 6	Appreciate the formulation of the problem of coupled oscillations and solve them to obtain normal modes of oscillation and their frequencies in simple mechanical systems.	1,2,3, 4	1,2,3, 4	1,4,8
CO 7	Figure out the formation of harmonics and overtones in a stretched string and acquire the knowledge on Ultrasonic waves, their production and detection and their applications in different fields.	1,2,3, 4	1,2,3, 4	1,3,4, 8
CO 8	Perform experiments on Properties of matter such as the determination of moduli of elasticity viz., Young's modulus, Rigidity modulus of certain 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.	1,4	1,4	1,2,3, 5,6,8
CO 9	Know how to determine the acceleration due to gravity at a place using Compound pendulum and Simple pendulum.	1,4	1,4	1,2,3, 5,6,8
CO 10	Notice the difference between flat resonance and sharp resonance in case of volume resonator and sonometer experiments respectively.	1,4	1,4	1,2,3, 5,6,8
CO 11	Verify the laws of transverse vibrations in a stretched string using sonometer and comment on the relation between frequency, length and tension of a stretched string under vibration.	1,4	1,4	1,2,3, 5,6,8



Course Code : PHY2SK

Course Name: Wave Optics

Upon completion of this course, the student will be able to:		MPC PSOS	MPCS PSOS	POS
CO1	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.	1,2	1,2	1,2,4,8
CO2	Distinguish between Fresnel's diffraction and Fraunhofer diffraction and observe the diffraction patterns in the case of single slit and the diffraction grating.	3,4	3,4	1,2,4,8
CO3	Describe the construction and working of zone plate and make the comparison of zone plate with convex lens.	1,2,3	1,2,3	1,4,8
CO4	Explain the various methods of production of plane, circularly and polarized light and their detection and the concept of optical activity..	1,2,3	1,2,3	1,4,8
CO5	Comprehend the basic principle of laser, the working of He-Ne laser and Ruby lasers and their applications in different fields.	1,3	1,3	1,2,4,8
CO6	Explain about the different aberrations in lenses and discuss the methods of minimizing them.	1,2,3	1,2,3	1,4,8
CO7	Understand the basic principles of fibre optic communication and explore the field of Holography and Nonlinear optics and their applications.	1,2,3	1,2,3	1,4,8
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.	1,4	1,4	1,2,3,5,6,8
CO9	Understand the principle of working of polarimeter and the measurement of specific rotatory power of sugar solution	1,4	1,4	1,2,3,5,6,8
CO10	Know the techniques involved in measuring the resolving power of telescope and dispersive power of the material of the prism.	1,4	1,4	1,2,3,5,6,8
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.	1,4	1,4	1,2,3,5,6,8



Course Code : PHY3SK

Course Name: Heat & Thermodynamics

Upon completion of this course, the student will be able to:		MPC PSOS	MPCS PSOS	POS
CO 1	Understand the basic aspects of kinetic theory of gases, Maxwell-Boltzman distribution law, equipartition of energies, mean free path of molecular collisions and the transport phenomenon in ideal gases	1,2,3, 4	1,2,3, 4	1,3,4, 8
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.	1,2,3	1,2,3	1,4,8
CO 3	Understand the working of Carnot's ideal heat engine, Carnot cycle and its efficiency	1,2,3, 4	1,2,3, 4	1,3,4, 8
CO 4	Develop critical understanding of concept of Thermodynamic potentials, the formulation of Maxwell's equations and its applications.	1,2,3	1,2,3	1,4,8
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.	1,3,4	1,3,4	1,8
CO 6	Examine the nature of black body radiations and the basic theories.	1,2,3	1,2,3	1,2,4, 8
CO 7	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.	1,4	1,4	1,2,3, 5,6,8



Course Code : PHY4SKA

Course Name: Electricity, Magnetism & Electronics

Upon completion of this course, the student will be able to:		MPC PSOS	MPCS PSOS	POS
CO1	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.	1,2,3	1,2,3	1,2,4,8
CO2	Distinguish between the magnetic effect of electric current and electromagnetic induction and apply the related laws in appropriate circumstances.	1,2,3,4	1,2,3,4	1,3,4,8
CO3	Understand Biot and Savart's law and Ampere's circuital law to describe and explain the generation of magnetic fields by electrical currents.	1,3,4	1,3,4	1,8
CO4	Develop an understanding on the unification of electric and magnetic fields and Maxwell's equations governing electromagnetic waves.	1,2,3	1,2,3	1,4,8
CO5	Phenomenon of resonance in LCR AC-circuits, sharpness of resonance, Q-factor, Power factor and the comparative study of series and parallel resonant circuits.	1,2,3,4	1,2,3,4	1,3,4,8
CO6	Describe the operation of p-n junction diodes, zener diodes, light emitting diodes and transistors	1,2,3	1,2,3	1,2,4,8
CO7	Understand the operation of basic logic gates and universal gates and their truth tables	1,3,4	1,3,4	1,8
CO8	Measure the current sensitivity and figure of merit of a moving coil galvanometer.	1,4	1,4	1,2,3,5,6,8
CO9	Observe the resonance condition in LCR series and parallel circuit	1,4	1,4	1,2,3,5,6,8
CO10	Learn how a sonometer can be used to determine the frequency of AC-supply.	1,4	1,4	1,2,3,5,6,8
CO11	Observe the variation of magnetic field along the axis of a circular coil carrying current using Stewart and Gee's apparatus.	1,4	1,4	1,2,3,5,6,8
CO12	Understand the operation of PN junction diode, Zener diode and a transistor and their V-I characteristics.	1,4	1,4	1,2,3,5,6,8
CO13	Construct the basic logic gates, half adder and full adder and verify their truth tables. Further, the student will understand how NAND and NOR gates can be used as universal building blocks	1,4	1,4	1,2,3,5,6,8



Course Code : PHY5SKB

Course Name: Modern Physics

Upon completion of this course, the student will be able to:		MPC PSOS	MPCS PSOS	POS
CO 1	Develop an understanding on the concepts of Atomic and Modern Physics, basic elementary quantum mechanics and nuclear physics.	1,2,3	1,2,3	1,4,8
CO 2	Develop critical understanding of concept of Matter waves and Uncertainty principle.	1,2,3, 4	1,2,3, 4	1,3,4, 8
CO 3	Get familiarized with the principles of quantum mechanics and the formulation of Schrodinger wave equation and its applications.	1,2,3, 4	1,2,3, 4	1,3,4, 8
CO 4	Examine the basic properties of nuclei, characteristics of Nuclear forces, salient features of Nuclear models and different nuclear radiation detectors.	1,3,4	1,3,4	1,8
CO 5	Classify Elementary particles based on their mass, charge, spin, half life and interaction.	1,2,3	1,2,3	1,2,4, 8
CO 6	Get familiarized with the nano materials, their unique properties and applications.	1,3,4	1,3,4	1,8
CO 7	Increase the awareness and appreciation of superconductors and their practical applications	1,2,3	1,2,3	1,4,8
CO 8	Measure charge of an electron and e/m value of an electron by Thomson method.	1,4	1,4	1,2,3, 5,6,8
CO 9	Understand how the Planck's constant can be determined using Photocell and LEDs.	1,4	1,4	1,2,3, 5,6,8
CO 10	Study the absorption of α -rays and β -rays, Range of β -particles and the characteristics of GM counter	1,4	1,4	1,2,3, 5,6,8
CO 11	Determine the Energy gap of a semiconductor using thermistor and junction diode.	1,4	1,4	1,2,3, 5,6,8



Course Code : PHY6SKB

Course Name: Low Temperature Physics & Refrigeration

Upon completion of this course, the student will be able to:		MPC PSOS	MPCS PSOS	POS
CO 1	Identify various methods and techniques used to produce low temperatures in the Laboratory.	1,2,3	1,2,3	1,2,4,8
CO 2	Acquire a critical knowledge on refrigeration and air conditioning.	1,2,3,4	1,2,3,4	1,3,4,8
CO 3	Demonstrate skills of Refrigerators through hands on experience and learns about refrigeration components and their accessories.	1,3,4	1,3,4	1,8
CO 4	Understand the classification, properties of refrigerants and their effects on environment.	1,2,3	1,2,3	1,4,8
CO 5	Comprehend the applications of Low Temperature physics and refrigeration.	1,2,3,4	1,2,3,4	1,3,4,8
CO 6	List out and identify and handle equipment used in refrigeration and low temperature lab.	1,2,3	1,2,3	1,2,4,8
CO 7	Learn the procedures of preparation of Freezing Mixtures.	1,3,4	1,3,4	1,8
CO 8	Demonstrate skills on developing various Freezing mixtures and materials and their applications in agriculture, medicine and day to day life,.	1,4	1,4	1,2,3,5,6,8
CO 9	Acquire skills in observing and measuring various methodologies of very low temperatures	1,4	1,4	1,2,3,5,6,8
CO 10	Perform some techniques related to Refrigeration and Freezing in daily life	1,4	1,4	1,2,3,5,6,8



Course Code : PHY5SCB

Course Name: Solar Energy & Applications

Upon completion of this course, the student will be able to:		MPC PSOS	MPCS PSOS	POS
CO 1	Understand Sun structure, forms of energy coming from the Sun and its measurement.	1,2,3	1,2,3	1,4,8
CO 2	Acquire a critical knowledge on the working of thermal and photovoltaic collectors.	1,2,3,4	1,2,3,4	1,3,4,8
CO 3	Demonstrate skills related to callus culture through hands on experience	1,2,3,4	1,2,3,4	1,3,4,8
CO 4	Understand testing procedures and fault analysis of thermal collectors and PV modules.	1,3,4	1,3,4	1,8
CO 5	Comprehend applications of thermal collectors and PV modules.	1,2,3	1,2,3	1,2,4,8
CO 6	List out and identify various components of solar thermal collectors and systems, solar photovoltaic modules and systems.	1,3,4	1,3,4	1,8
CO 7	Learn the procedures for measurement of direct, global and diffuse solar radiation, I-V characteristics and efficiency analysis of solar cells and modules.	1,2,3	1,2,3	1,4,8
CO 8	Demonstrate skills acquired in evaluating the performance of solar cell / module in connecting them appropriately to get required power output.	1,4	1,4	1,2,3,5,6,8
CO 9	Acquire skills in identification and elimination of the damaged panels without affecting the output power in a module / array.	1,4	1,4	1,2,3,5,6,8
CO 10	Perform procedures and techniques related to general maintenance of solar thermal and photovoltaic modules	1,4	1,4	1,2,3,5,6,8