



*Ready for
Every Good Work*

SACRED HEART COLLEGE (AUTONOMOUS)

Tirupattur – 635 601, Tamil Nadu, S.India

Resi : (04179) 220103

College : (04179) 220553

Fax : (04179) 226423

A Don Bosco Institution of Higher Education, Founded in 1951 * Affiliated to Thiruvalluvar University, Vellore * Autonomous since 1987

Accredited by NAAC (4th Cycle – under RAF) with CGPA of 3.31 / 4 at 'A+' Grade

Name of the Programme: B. Sc Physics

S. No	Title of the Paper	Course Code	Course Objectives	Course Outcomes	Relevance
1	PHYSICS MAIN PRACTICAL'S – I	PP207	<ul style="list-style-type: none"> To determine the Young's modulus of materials in the form of a beam. To calibrate voltmeter and ammeter using potentiometer. To determine the viscosity and surfacetension of liquids. To learn the usage of spectrometer and to determine the refractive index of material of a prism.. To construct basic logic gates using discrete components and verify their truth tables. To construct low range power pack and stabilized power supply circuits and measure their outputs 	<p>On successful completion of the course, the students will be able to</p> <ul style="list-style-type: none"> Acquire laboratory skills/practical skills, a capacity for self management and teamwork,. They will be able to handle optical, electrical and electronic instruments effectively to take measurements/observations. Develop analytical and scientific reasoning skills. They will be able to analyze the measurements/observations to draw valid conclusions. Determine the Young's modulus of materials in the form of beam, the rigidity modulus of materials in the form of wire, Viscosity, surface tension and Interfacial surface tension of liquids and recall the theory behind the experiments. State the laws of transverse vibration of strings and measure the frequency of tuning forks and ac using sonometer. 	Regional & National developmental needs

				<ul style="list-style-type: none"> • Determine the focal length of convex and concave lenses, measure the refractive index of material of a prism using spectrometer and estimate the thickness of a thin wire by forming air wedge. • Design experiment to study the characteristics of Zener diode, construct stabilized power supply using zener diode, construct basic logic gates using diodes and transistor and examine their operation. 	
2	ELECTRICITY AND MAGNETISM	P312	<ul style="list-style-type: none"> • To introduce to the students the basic concepts of Electrostatics • To make the students understand concepts on working and applications of capacitors and electrometers • To explain the principle and working of Potentiometer and Carey Foster's Bridge. Also to understand the working of LCR and resonance circuits. 	<p>On successful completion of course, the students will be able to</p> <ul style="list-style-type: none"> • Explain and differentiate between electric field and electric potential and also illustrate the coulomb's law and its applications • Understand the functions and the basic principles of capacitors and electrometers. • Explain the working principle of Carey-Foster bridge and Potentiometer and apply their knowledge to set up experiments in the laboratory. 	Regional & National developmental needs

			<ul style="list-style-type: none"> To provide an overview of the fundamental principles of Coulomb's law, Biot-Savart law and magnetostatics. To make the students understand the various types of magnetism. 	<ul style="list-style-type: none"> State and explain various laws of magnetostatics and illustrate their applications. <p>Compare the properties of Dia, Para and Ferro magnetic materials and identify the form of magnetism possessed by a material</p>	
3	OPTICS	P313	<ul style="list-style-type: none"> To impart the knowledge on angular dispersion produced by prism, aberrations in lenses and methods of minimizing them in thin lenses. To understand the basic phenomena of interference and determination of thickness of a thin wire and refractive index of medium by using various interference experiments To explain the diffraction of light and classify Fresnel's and Fraunhofer diffraction with illustration of necessary theory and experiments. 	<p>On successful completion of the course, the students will be able to</p> <ul style="list-style-type: none"> Differentiate the various aberrations in lenses and describe different methods of minimizing them. Explain the phenomenon of interference and illustrate interference experiments to find the thickness of a thin wire and refractive index of medium Exemplify the diffraction of light and compare the Fresnel's and Fraunhofer diffraction of light with an illustrative diffraction experiments Compare the different types of polarization of light waves and analyze the optical characteristics when the light is passing through the crystals 	Regional & National developmental needs

			<ul style="list-style-type: none"> • To Illustrate the polarization of light waves, their types and explain the various optical activity produced when the light passing through the crystal. • To apply the LASER/MASER action produced in the material; analyze the principle, working mechanism and applications. 	<ul style="list-style-type: none"> • State the principle of LASER/MASER action in materials and set up experiments to demonstrate the working mechanism of CO₂ and semiconductor lasers 	
4	PHYSICS MAIN PRACTICALS – II	PP413	<ul style="list-style-type: none"> • To determine the Young's modulus of materials in the form of a beam by subjecting them to Uniform and Nonuniform bending. • To calibrate voltmeter and ammeter using potentiometer. • To determine the viscosity and surfacetension of liquids. • To learn the usage of spectrometer and to determine the wavelength of spectral lines. 	<p>On successful completion of the course, the students will be able to</p> <ul style="list-style-type: none"> • Use the spectrometer to estimate the wavelength of spectral lines and the refractive index of materials • Inspect the effective usage of Potentiometers, Careyfooster's bridge and BG • Describe the working of microscope and the telescope and use them effectively • Recall the logic functions of basic logic gates and design arithmetic circuits using discrete components and ICs 	Regional & National developmental needs

			<ul style="list-style-type: none"> • To verify the logic functions of basic logic gates and design arithmetic circuits using discrete components and ICs. • To construct analog dual power supply and voltage stabilization circuits and measure their outputs. 	<ul style="list-style-type: none"> • Construct analog dual power supply circuits and voltage stabilization circuits and measure their outputs 	
5	ALLIED PHYSICS PRACTICALS FOR CHEMISTRY	PAP409 A	<ul style="list-style-type: none"> • To perform experiments on elasticity of materials and viscosity of liquids • To demonstrate an experiment to determine the frequency of ac mains • To perform experiments on interference of light waves and its applications. • To do calibration of voltmeter and ammeter using potentiometer • To design simple analog and digital electronic circuits. 	<p>On successful completion of the course, the students will be able to</p> <ul style="list-style-type: none"> • Apply their knowledge on properties of matter to perform experiments to determine the Young's modulus and Rigidity modulus of materials and viscosity of liquids • Perform an experiment to determine the frequency of ac mains using sonometer and analyze the result obtained. • Set up Newton's rings and air wedge experiments and apply their knowledge on interference of light waves to determine the refractive index of material of a lens and thickness of a wire. • Use potentiometer to calibrate low range voltmeter and high range ammeter and explain the principle behind the experiment. 	Regional & National developmental needs

				<ul style="list-style-type: none"> Recall the logic function of different logic gates and employ them to construct simple electronic circuits. 	
6	ALLIED PHYSICS FOR COMPUTER SCIENCE –I	AP309B	<ul style="list-style-type: none"> To make the students to explore the Physics in active devices and also to introduce the concept of semiconductors and their working principles To explore the principles and applications of passive devices. To understand the series and parallel circuits and their short and open circuits in real time applications. To induce the minds of the students to understand the principle and applications of LASER in science and technology. To make the students the importance of the optical fiber communication, LED, Photoresistor and solar cell. 	<p>On successful completion of the course, the students will be able to</p> <ul style="list-style-type: none"> Analyze the functions of active devices especially diodes and transistors. Calculate the values of resistors and capacitors from the colour coding and understand the importance of the passive devices in everyday life. Identify the short and open circuits in complex circuits which consist of series and parallel components. Realize the importance of LASER in modern science and technology. Understand the working principle of fiber optic cable, LED, LCD, photoresistor and solar cell. 	Regional & National developmental needs
7	ALLIED PHYSICS FOR COMPUTER SCIENCE – II	AP409B	<ul style="list-style-type: none"> To introduce the fundamental concepts and working principles of various semiconductor devices and their 	<p>On successful completion of the course, the students will be able to</p> <ul style="list-style-type: none"> Understand the working principle of JFET and design rectifier circuits. 	Regional & National developmental needs

			<p>applications.</p> <ul style="list-style-type: none"> • To introduce the basic concepts of operational amplifier and its various applications. • To familiarize the switching characteristics of transistor, various multivibrators, applications of diode as integrator, differentiator, clipper and clamper. • To familiarize with the different number systems and combinational circuits utilized in the digital circuits. • To study the working of various flip-flops, registers, counters and their applications. 	<ul style="list-style-type: none"> • Apply knowledge on op-amp to design and analyze various applications of op-amps. • Understand the working of multivibrators and design wave shaping circuits. • Gain knowledge of different types of number systems and their mutual conversions, State and prove DeMorgan's theorems and Explain the working principle of combinational circuits. • Construct and evaluate the performance of flip-flops, registers and counters. 	
8	ALLIED PHYSICS PRACTICALS FOR COMPUTER SCIENCE	PAP409 B	<ul style="list-style-type: none"> • To have an hands on training to handle the electronic components and bread board • To construct the logic circuits and demonstrate the output by truth tables • To realize the importance of calibration of voltmeter and galvanometer 	<p>On successful completion of the course, the students will be able to</p> <ul style="list-style-type: none"> • Handle the electronic components for constructing electronic circuits. • Construct logic gate circuits. • Calibrate voltmeter and galvanometer. • Verify the Physics laws especially Ohms law and De Morgan's theorem. 	Regional & National developmental needs

			<ul style="list-style-type: none"> • To verify the theorems and Physics laws using passive and active devices • To construct stabilized power supply by them self 	<ul style="list-style-type: none"> • Construct stabilized power supply. 	
9	SEMICONDUCTOR DEVICES AND THEIR APPLICATIONS	P535	<ul style="list-style-type: none"> • To introduce diodes and their types along with their applications • To provide an overview of the principles, operation and applications of FET, MOSFET, UJT and SCR. • To Provide an overview of small signal and large signal amplifiers. • To Inculcating basic concepts about oscillators, their construction and working. • To introduce an operational amplifier and their linear and non-linear applications. 	<p>On successful completion of the course, the students will be able to</p> <ul style="list-style-type: none"> • explain the implications of characteristics of various types of diodes and different rectification process. • acquiring knowledge on Fabrication of a transistor, JFET, MOSFET, UJT and SCR • demonstrate the basic concept behind the working of a transistor amplifier, and able to explain the working of R-C coupled amplifier and calculate the gain of multistage amplifiers. • demonstrate the basic concept behind the working of an oscillator and multivibrators. • solving various mathematical operations like summing, difference, integrators, differentiators, sign changers etc., using operational amplifier 	Regional & National developmental needs

10	SUBJECT ELECTIVE - I: RENEWABLE ENERGY AND ENERGY HARVESTING	P538C	<ul style="list-style-type: none"> • To make the students to understand the importance of fossil fuels, conventional energy resources. • To provide a complete idea of basic components of a typical solar collectors and its applications in the solar energy absorption equipment's. • To make the students to analyze the dissimilarity between Horizontal axis and vertical axis WECS. • To enable the students to comprehend the concept behind various energy sources including biomass, tidal energy and hydrogen energy. • To give a basic knowledge about various methods of energy harnessing, storage systems and distribution. 	<p>On successful completion of the course, the students will be able to</p> <ul style="list-style-type: none"> • Explain the basic ideas on commercial and non-conventional energy resources and illustrate their availability. • Explain the construction and designing of solar collectors and its implementation in the solar energy equipments. • Demonstrate the variance in the operation of vertical axis and horizontal axis WECS and its installation towards power production. • Infer the knowledge on various energy sources including ocean, tidal and biomass conversion technologies. • Realize the need of energy harvesting and describe the methods of storage systems to achieve the sustainability in the energy sector. 	Regional & National developmental needs
11	SUBJECT ELECTIVE II: MEDICAL PHYSICS	P539C	<ul style="list-style-type: none"> • To provide a knowledge on the physics principles involved in the pressure system, optical system, dynamics of human body and acoustics of human body. 	<p>On successful completion of the course, the students will be able to</p> <ul style="list-style-type: none"> • Explain and differentiate the various physics principles involved in the dynamics of human body and in the pressure system, optical system, and acoustics of human 	Regional & National developmental needs

			<ul style="list-style-type: none"> • To understand radiation exposure and its measurement and the working mechanism of different radiation detectors. • To learn the principles and instrumentation involved in various diagnostic systems. • To enable the students to understand the principle, instrumentation and working of biological imaging systems. • To create awareness on radiation hazards and protection against radiation hazards. 	<p>body.</p> <ul style="list-style-type: none"> • understand and distinguish the various units used in radiation exposure measurement and describe the working mechanism of different radiation detectors. • Demonstrate an understanding of working principle and instrumentation of various diagnostic systems. • understand the principle, instrumentation and working of biological imaging systems and evaluate their merits and demerits. • Describe various radiation hazards and design equipment for protection against radiation hazards. 	
12	ASTROPHYSICS	P720C	<ul style="list-style-type: none"> • To introduce the students to universe and its evaluation. • To impart knowledge on galaxies and its types. • To understand the basic structure and properties of milky way galaxy. • To provide an overview of solar system. • To learn methods of estimating astronomical distances and temperature and radius of stars 	<p>On successful completion of the course, the students will be able to</p> <ul style="list-style-type: none"> • Understand and explain the origin of Universe and predict the present age of the universe. • Describe the classification of galaxies. • Acquire basic knowledge of milky way galaxy and its properties. • Explain the Solar system and its origin. • Estimate astronomical distances and temperature and radius of stars. 	Regional & National developmental needs

13	SELF STUDY: LASER PHYSICS AND FIBER OPTICS	P541SP1	<ul style="list-style-type: none"> • To introduce the students to the basic principles of LASER. • To provide a knowledge on various types of LASERs. • To enhance the knowledge of different applications of LASER in Material Processing and Electronics Industry. • To familiarize the applications of LASERS in Nuclear Energy and medicine. • To provide an opportunity for the students to learn about Optical fibres and Optical fibre communication system. 	<p>On successful completion of the course, the students will be able to</p> <ul style="list-style-type: none"> • Explain the basic principle of Laser emission. • Examine the working principle and design considerations of various lasers. • Outline the applications of laser in industries. • Gain knowledge on applications of Lasers in fields such as Nuclear Energy, Medicine and Surgery. • Comprehend the significance of optical fibre communication system. 	Regional & National developmental needs
14	APPLIED ELECTRONICS	P631	<ul style="list-style-type: none"> • To learn about basic logic gates, DeMorgan's theorems, Simplification of Boolean expressions and implementation of logic circuits using NAND-NAND logic. • To learn design, working and truth table of combinational circuits. • To study about different logic families and flip flops. 	<p>On successful completion of the course, the students will be able to</p> <ul style="list-style-type: none"> • Simplify Boolean expressions using K-map and design NAND-NAND logic circuits. • Construct arithmetic circuits and explain their operation. • Compare different logic families and explain the working of various flip flops. 	Regional & National developmental needs

			<ul style="list-style-type: none"> To understand the working of Shift registers, Asynchronous counters and Synchronous counters. To study about the different types of ADC and DAC and the architecture and applications of timer IC 555. 	<ul style="list-style-type: none"> Acquire a knowledge on Shift registers and counters and construct different Modulus counters. Explain the working of different types of ADC and DAC and predict their output voltage and describe the architecture and applications of timer IC 555. 	
15	PHYSICS MAIN PRACTICALS – III (GENERAL EXPERIMENTS)	PP615	<ul style="list-style-type: none"> To familiarize the students with physics concepts and experiments. To acquaint the importance of practical experiments to students. To develop an understanding among students about conversion of a galvanometer into voltmeter and ammeters. To train the students in handling physics experiments. To facilitate the students for handling spectrometer and B.G experiments. 	<p>On successful completion of the course, the students will be able to</p> <ul style="list-style-type: none"> Design a circuit to convert a galvanometer into voltmeter and ammeter with desired calibration. Apply the knowledge on potentiometer to estimate the EMF of a thermocouple. Estimate the value of g using compound pendulum. Recall the concept of Young's modulus and evaluate the young's modulus of the material of the given bar. Demonstrate experiments using spectrometer to determine the dispersive power of prism and refractive index of the material of the prism Determination of wavelength of Laser light using diffraction at a single slit 	Regional & National developmental needs

16	PHYSICS MAIN PRACTICALS – IV (ELECTRONIC EXPERIMENTS)	PP616	<ul style="list-style-type: none"> • To construct Halfsubtractor, Full subtractor, 4 bit binary adder and 4 bit binary subtractor circuits using ICs and verify their truth tables. • To simplify the given Boolean expressions using Karnaugh map, construct NAND-NAND circuit for the simplified expression and verify the truth table. • To design Inverting and Non inverting amplifiers, Summer, Subtractor, Differentiator and Integrator circuits using OPAMP. • To learn to construct amplifiers, Oscillators and Multivibrators using Transistors and measure their outputs. • To write assembly language programs for performing Addition, Subtraction, Multiplication, Division, Arranging the numbers in ascending order and in descending order and execute them using 8085 microprocessor and verify the results. 	<p>On successful completion of the course, the students will be able to</p> <ul style="list-style-type: none"> • Construct Halfsubtractor, Full subtractor, 4 bit binary adder and 4 bit binary subtractor circuits using ICs and verify their truth tables. • Simplify given Boolean expressions using Karnaugh map, construct NAND-NAND circuit for the simplified expression and verify the truth table. • Design Inverting and Non inverting amplifiers, Summer, Subtractor, Differentiator and Integrator circuits using OPAMP. • Construct amplifiers, Oscillators and Multivibrators using Transistors and measure their outputs. • Write assembly language programs for performing Addition, Subtraction, Multiplication, Division, Arranging the numbers in ascending order and in descending order and execute them using 8085 microprocessor and verify the results. 	Regional & National developmental needs
----	---	-------	--	--	--

17	SUBJECT SKILL – I : ELECTRICAL CIRCUITS AND NETWORKS (THEORY)	P634S	<ul style="list-style-type: none"> • To develop an understanding of the basics of electrical devices and circuits. • To understand the fundamental laws of electrical circuits and various circuit analysis theorems. • To develop an understanding of single-phase and three-phase AC. • To know the effect of open circuits and short circuits • To impart knowledge of domestic wiring and circuit breakers. 	<p>On successful completion of the course, the students will be able to</p> <ul style="list-style-type: none"> • Understand the symbols and working principles of electrical devices and circuits • Analyze electrical circuits (DC and AC) using mesh and network simplification theorems. • Differentiate between single-phase and three-phase AC and explain the working of AC circuits. • Explain the effects of shorts and opens in series and parallel circuits. • Understand domestic electrical wiring and the working of circuit breakers 	Regional & National developmental needs
18	BASIC INSTRUMENTATI ON	P641S	<ul style="list-style-type: none"> • To develop knowledge of principles and working of various analog meters. • To understand the principle and working of analog electrical instruments. • To impart knowledge of principles and working of digital instruments. • To learn about the working principle of various optical instruments used in measurement of physical quantities. 	<p>On successful completion of the course, the students will be able to</p> <ul style="list-style-type: none"> • Acquire knowledge about the working principles of various analog meter instruments. • Understand the operation of various analog electrical instruments. • Differentiate between digital and analog instruments and explain their working. • Outline the working principle of various optical instruments. 	Regional & National developmental needs

			<ul style="list-style-type: none"> To develop the skill of usage of environmental instruments. 	<ul style="list-style-type: none"> Gain knowledge on the working and applications of various environmental instruments. 	
19	NON MAJOR ELECTIVE –I : REPAIR AND MAINTENANCE OF HOUSEHOLD APPLIANCES	NPH503	<ul style="list-style-type: none"> To provide an understanding of the basics of electricity and electrical safety. To enable the students to understand the importance of earthing and energy storage devices. To expose the students to the principles and working of home appliances. To learn fault finding and replacing faulty component in electric iron. To train the students in Repaire and Maintenance of home appliances. 	<p>On successful completion of the course, the students will be able to</p> <ul style="list-style-type: none"> Recall the safety precautions and apply them whenever it is necessary Understand the importance of earthing and acquire a knowledge on energy storage devices Identify the fault in an electric iron box and rectify it Explain the working of mixer, grinder, ceiling and table fans. Install and test fluorescent lamp chock and starter 	Regional & National developmental needs

20	PHYSICS REVISITED SSP	P643SP1	<ul style="list-style-type: none"> • To enable the students to revise the concepts of mechanics, oscillations, waves, Black body radiation. • To recollect the concepts of thermodynamics and statistical physics. • To revisit the contents of Quantum mechanics • To help the students to review the concepts in Atomic and Nuclear Physics. • To understand the significance of semiconductor devices and their applications, this would help them to perform better in competitive examinations. 	<p>On successful completion of the course, the students will be able to</p> <ul style="list-style-type: none"> • Recollect the basic concepts in mechanics, Waves and oscillations and explain black body radiation. • Recall the laws of thermodynamics, classical and quantum statistics. • Formulate the Schrodinger wave equation for free state and bounded state problems and evaluate the energy eigen value • Summarize the concepts in Atomic and Nuclear Physics. • Outline the working principle of semiconductor devices . 	<p>Regional & National developmental needs</p>
----	-----------------------------	---------	---	---	---