DEPARTMENT OF PHYSICS

MAHARAJA'S COLLEGE, ERNAKULAM

PSO (Program Specific Outcomes)- B.Sc. Physics Instrumentation

▶ PSO1: Understand the mathematical basis of physics and apply the knowledge to certain specific problems of physics.
▶ PSO2: Understand how a theory is developed/should be developed through the example of evolution of Special relativity and Quantum mechanics.
▶ PSO3: Understand the errors in measurements and learn to calculate the error.
▶ PSO4: Understand the sources of knowledge in physics and how to communicate physics.
▶ PSO5: Understand the mechanical, electric, magnetic and thermodynamic properties of matter, the principles of electronics and the theoretical basis of classical and quantum mechanics, relativity, electrodynamics, optics, astrophysics and statistical physics, nuclear and particle physics and to apply the knowledge for analyzing and solving problems.
▶ PSO6: Understand the fundamentals of Programming to apply it for numerical solution.
▶ PSO7: Apply and verify the theoretical concepts and facts by laboratory experiments.
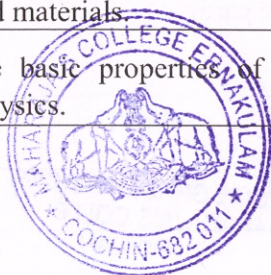
CO (COURSE OUTCOMES)

First Core Courses (B.Sc. physics Instrumentation)

PHY1COR01- Methods of Physics

	COURSE OUTCOMES	PSO	CL	KC	Allotted hrs
CO1	Understand the basic mathematical tools of physics and apply the knowledge toproblems of mechanics and electricity	PSO1	U, Ap	KC-C	9
CO2	Understand development of Special relativity and Quantum mechanics.	PSO2	U	KC-F	9
CO3	Understand the errors in physical measurements and learn to calculate the error.	PSO3	U, Ap, An	KC-C	9
CO4	Understand the sources of knowledge in physics and how to communicate physics	.PSO4,	U	KC-F	9

PHY2COR02- Properties of Matter

	COURSE OUTCOMES	PSO	CL	KC	Allotted hrs
CO1	Understand the principles of elasticity and the strength of solid materials.	PSO5	U,Ap	KC-C,F	12
CO2:	Understand the basic properties of liquids and gases and its physics.	PSO5	U	C,F	12

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|		COURSE OUTCOMES	PSO5	U	C,F	12
CO3		Understand the techniques of low-pressure creation and low pressure-measurement	PSO5	U	C,F	12

PHY3COR03 - Basic Electronics

	COURSE OUTCOMES	PSO	CL	KC	Allotted hrs
CO1	Distinguish between digital and analog circuits and applications of Norton's and Thevenin's theorems to trouble shoot analog circuits	5	U, AP	C,F	12
CO2	Understanding basics diode theory to solve problems and henceto analyze wave shaping circuits.	5	U, AP, An	C,F	10
CO3	Realize different transistor characteristics, transistor testing undervarious biasing and troubleshooting techniques.	5	U, AP,An	C,F	10
CO4	Understand different forms of power amplifiers and its applications.	5	U, AP	C,F	6
CO5	Acquire basic ideas of OP-AMPS and its operational modes andhence it implementation in different circuits.	5	U, AP,An	C,F	6
CO6	Understanding number systems ,logic gates, Boolean algebra and applications of Boolean algebra to solve to digital circuits.	5	U, AP,An	C,F	10

PHY4COR04 - Electricity, Magnetism & Electrodynamics

	COURSE OUTCOMES	PSO	CL	KC	Allotted hrs
CO1	Understand vectors and vector calculus necessary for learning electrodynamics.	1	U,Ap.An	KC-C	18
CO2	Understand the fundamentals of Electrodynamics.	PSO5	CL-U,	KC-C	18
CO3	Understand the behaviour of transient currents and alternating currents in LCRcircuit.	PSO5,	CL-U, Ap	KC-C, P	18

PHY5COR05 - Classical Mechanics

|	COURSE OUTCOMES	PSO	CL	KC	Allotted hrs
CO1	Understand the different frames of reference and the Newtonian mechanics of a single particle and system of particles.	PS05	CL - U, Ap	KC – F,C	14
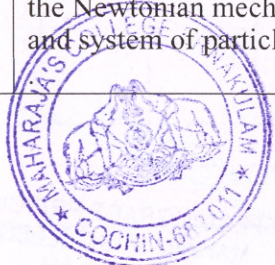
C02	Understand and apply Lagrange's formalism with special emphasis on generalized co-ordinates.	PS05	CL – U, Ap	KC – C, P	10
C03	Examine the link between symmetry properties and conservation laws.	PS05	CL – An,Ap	KC– C	10
C04	Understand the concept of central forces andexamine the features of planetary motion	PS05	CL – U, Ap, An	KC – C, P	10
C05	Analyse and apply the characteristics and dynamicalequations of systems of rigid body motion.	PS05	CL – An, Ap	KC – C	10

PHY5COR06 - Thermal & Statistical Physics

	COURSE OUTCOME	PSO	CL	KL	Allotted hrs
CO1	To understand the concept of heat , zerothand first law of thermodynamics to get knowledge of various thermodynamic processes and thermal conductivity.	PSO5	U, An, Ap	C,F	18
CO2	To understand, analyse and apply the concepts and facts about the basic ideas behind different heat engines	PSO5	U, An, Ap	C,F	10
CO3	To understand, analyse and apply the concepts and facts of entropy, thermodynamic potentials, maxwell's thermodynamic relations and phase transitions.	PSO5	U, An, Ap	C,F	14
CO4	To understand and analyse some of the basic concepts of statistical physics.	PSO5	U,An, Ap	C,F	12

PHY5COR07 – Quantum Mechanics and Spectroscopy

	COURSE OUTCOME	PSO	CL	KC	Allotted hrs
CO1	Understanding the various experimental techniques to realize dualnature of light and matter and its applications to solve problems	2, 5	U, AP	C,F	10
CO2	Get basic ideas of quantum mechanics to solve fundamentalproblems in Quantum mechanics	2,5	U, AP	C,F	12
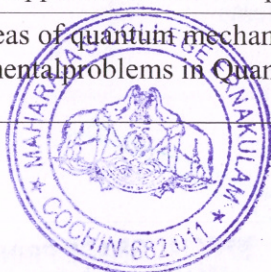
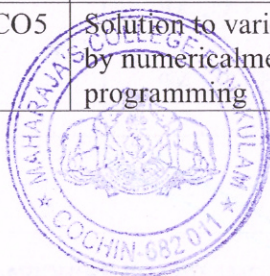| CO	COURSE OUTCOME	PSO	CL	KC	Allotted hrs
CO3	Application of quantum mechanics to realize various atomicspectroscopic techniques.	2,5	U, AP	C,F	12
CO4	Application of the quantum mechanics to solve molecularspectroscopy	5	U, AP	C,F	10
CO5	Understand the theory of rotational vibrational spectroscopy andapply them to find out material properties	5	U, AP,An	C,F	10

PHY6COR09 - Nuclear & Particle Physics

CO	COURSE OUTCOME	PSO	CL	KC	Allotted hrs
CO1	To understand the structure of nucleus, varous propertiesand their measurements and to study different nuclear models.	PSO5	U, Ap, An	C, F, P	12
CO2	To study transormations of nuclei and the phenomenon ofradioactivity, nuclear transformations leading to fission, fusion and the design of nuclear reactors.	PSO5	U, An, Ap	C, F, P	12
CO3	To study the purpose and design of radiation detectors andparticle accelerators	PSO5	U, An, Ap	C, F, P	10
CO4	To study the interactions between elementary particles andquark model	PSO5	U, An, An	C, F	10
CO5	To study about cosmic rays and different effects of cosmicrays	PSO5	U, An, An	C, F, P	10

PHY6COR10 – Numerical methods & Computational Physics

	COURSE OUTCOME	PSO	CL	KC	Allotted hrs
CO1	Understand flowcharts and algorithms and utilize them insolving different problem	6	U, AP	C,F	10
CO2	realize various modes of errors in computations and familiarizeto minimize them	1,6	U, AP	C,F	12
CO3	Learn about various numerical methods to solve problemsnumerically	1,6	U, AP	C,F	12
CO4	Learn basic python programming techniques and application toof python programs to analyze different problems	6	U, Ap,An	C,F,P	10
CO5	Solution to various mathematical problems by numericalmethods using python programming	6	U, Ap,An	C,F,P	10
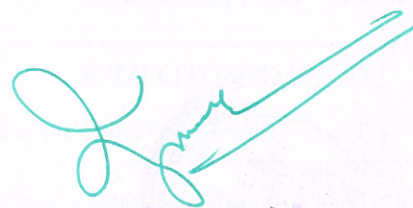
PHY6COR11 - Condensed Matter Physics

	COURSE OUTCOME	PSO	CL	KC	Allotted hrs
CO1	Understand basics concepts in and different crystal lattices and distinguishthe crystal structures. Procedure behindthe construction of reciprocal lattice is understood and applied the same in explaining the diffraction patterns.	PSO5	U, Ap, An	C,P	14
CO2	Basic theory behind the electrical and thermal conduction is understood. Identifyand distinguish the situations where classical explanation and quantum explanation is needed. Knowledge in quantum mechanics is applied to understand the band structure in material.	PSO5	U,An, Ap	F,C	15
CO3	Identify and classify the different types ofpolar materials, undertand the different theories in explaning the dielectric and magnetic properties of materials. Understand the application of piezoelectric, ferroelectric and dielectricmaterials.	PSO5	U, An,Ap	C,F,P	17
CO4	Understanding the fundamental theory of superconductivity, classification of superconductors and their application s in various fields.	PSO5	U, An	C,F	17

PHY6COR12 - Special Theory of Relativity & Astrophysics

	COURSE OUTCOMES	PSO	CL	KC	Allotted hrs
CO1	Understand and appreciate the concept of space-time and the relative character ofthe physical quantities	PSO5	U, Ap, An	C,F	18
CO2	Understand the terms and techniques of observational astronomy.	PSO5	U, Ap,	C, F	18
CO3	Understand the formation, equilibrium and evolution of stars.	PSO5	CL-U	C,F	18

Second Core Courses (B.Sc. physics Instrumentation)

INS1COR01-Basics of Mechanical Engineering

	COURSE OUTCOMES	PSO	CL	KC	Allotted hrs
CO 1	To study the various tools used, hands-on training is given in different sections. Essentially student should know the labor involved, machinery or equipment necessary. To gain theoretical knowledge in material casting processes and develops an understanding of the parts used in that. To impart concepts of different primary shaping processes.	PSO4	CL-U	KC-F, P	10
CO 2	To understand the basic concepts of Manufacturing process like machining, joining, surface finishing.	PSO4	CL-U	KC-F, P	14
CO 3	Understand the different types of power transmission methods and its application. Analyze different types of bearings and its application, design procedure of Ball Bearings and Sliding contact bearing. Comprehend different types of clutches and its applications and to analyze single and multiple clutches.	PSO4	CL-U	KC-F, P	20
CO 4	Familiarity with different types of measurement systems/devices for engineering measurements	PSO4	, CL-U	KC-F, P	10

INS1COR02 - Basic Instrumentation

	COURSE OUTCOMES	PSO	CL	KC	Allotted hrs
CO 1	To introduce the basic concept instrumentation and the possible errors and its calculation. To gain theoretical and practical knowledge in types and elements in instrument	PSO5, PSO12	U,Ap	KC-F,P	15
CO 2	To introduce the concept of circuit elements, analog circuits and fundamentals .	PSO5, PSO12	U,Ap	KC-F,P	15
CO 3	To provide a foundation in basic meters and its application. Get introduced to the concept of bridges and learn its application in practical.	PSO5, PSO12	U,Ap	KC-F,P	12
CO 4	The students should be able to learn the fundamentals of Networks and its applications. Study basic concepts of Magnetism	PSO5, PSO12	U,Ap	KC-F,P	12

INS2COR03 - Basic Measurements

	COURSE OUTCOMES	PSO	CL	KC	Allotted hrs
CO 1	To introduce a knowledge about displacement, force and torque. To impart different measurement techniques of the	PSO5,	CL-U, Ap, C,	KC-F, P	

|					
	above variables.				
CO 2	To introduce a knowledge about speed, dimension and weight. To impart different measurement techniques of the above variables.	PSO5,	CL-U, Ap, C,	KC-F, P	
CO 3	To introduce a knowledge about density, viscosity and humidity. To impart different measurement techniques of the above variables	PSO5,	CL-U, Ap, C,	KC-F, P	
CO 4	To introduce a knowledge about acceleration, specific gravity, conductivity. To impart different measurement techniques of the above variables.	PSO5,	CL-U, Ap, C,	KC-F, P	

INS2COR04 - Industrial Instrumentation 1

	COURSE OUTCOMES	PSO	CL	KC	Allotted hrs
CO 1	To make students aware of various types of pressure sensors and its applications in industries.	PSO5	CL-U, Ap, C	KC-F,P	12
CO 2	Introduce vacuum and its fundamentals	PSO5	CL-U, Ap, C	KC-F,P	14
CO 3	Gain knowledge about vacuum measurement instruments and introduce application	PSO5	CL-U, Ap, C	KC-F,P	14
CO 4	Get knowledge about temperature measurement and understand the applications.	PSO5	CL-U, Ap, C	KC-F,P	14

INS3COR05 - Industrial Instrumentation 2

	COURSE OUTCOMES	PSO	CL	KC	Allotted hrs
CO1	To make students aware of various types of level sensors and its applications in industries.	PSO5,	CL-U, Ap, C	KC-F, P	25
CO 2	To make students aware of various types of flow sensors and its applications in industries.	PSO5,	CL-U, Ap, C	KC-F, P	25
CO3	Familiarize pH and make knowledge about electrodes used in pH measurement. Study the smart sensors used in real time applications.	PSO5,	CL-U, Ap, C	KC-F, P	20
CO 4	To understand about vibration and how it is measured in industries. Introduce various types of detectors.	PSO5,	CL-U, Ap, C	KC-F, P	20

INS3COR06 - Transducers and Signal Conditioners

	COURSE OUTCOMES	PSO	CL	KC	Allotted hrs
CO 1	Familiarize different types of transducer and different input system. Study the dynamic response of system	PSO6	CL-An,C	KC-C,P	12
CO 2	To study various types of signal conditioners like modulator, filter etc.	PSO6	CL-An,C	KC-C,P	14

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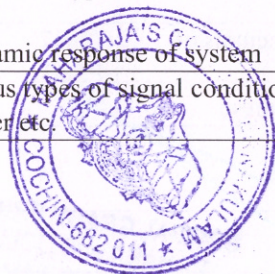
	COURSE OUTCOMES	PSO	CL	KC	Allotted hrs
CO 3	Familiarize different types of display devices and its applications	PSO6	CL-An,C	KC-C,P	14
CO 4	Understand various types of recorders and printers.	PSO6	CL-An,C	KC-C,P	14

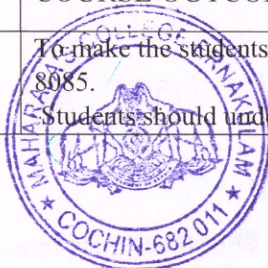### INS4COR07-Process Control Instrumentation

	COURSE OUTCOMES	PSO	CL	KC	Allotted hrs
CO 1	Introduce a process and gain the knowledge of a controller in process. This course develops the students approach to identify different Control system components like Hydraulic, Pneumatic, Electrical and Electronic . To make the students understand all the processes involved in the industries, the various unit operations and be able to apply control schemes to these processes to get the output with desired specifications.	PSO5, PSO9	CL-U,Ap	KC-F,P	16
CO 2	To study the process characteristics and parameter. Introduction to different controller modes.	PSO5, PSO9	CL-U,Ap	KC-F,P	14
CO3	To study different analog and digital controller modes in process controller.	PSO5, PSO9	CL-U,Ap	KC-F,P	12
CO4	Understand different process controllers for process variables. To introduce different types of tuning methods.	PSO5, PSO9	CL-U,Ap	KC-F,P	12

INS4COR08 - Bio Medical Instrumentation

	COURSE OUTCOMES	PSO	CL	KC	Allotted hrs
CO 1	To make the students acquainted with safety requirements in biomedical field. Introduction to biology basics. Understand the various types of electrodes used in biomedical	PSO5	CL-U,Ap	KC-F	25
CO 2	Identify various Bio-potential and their specifications in terms of amplitude and frequency using different diagnostic tool like ECG, EEG and EMG	PSO5	CL-U,Ap	KC-F	25
CO 3	To know about direct and indirect blood pressure measurement.	PSO5	CL-U,Ap	KC-F	20
CO4	Gain the knowledge of biomedical instruments used for to protect the life of patients. To analyze the hazards and its safety precautions.	PSO5	CL-U,Ap	KC-F	20

INS6COR09 - Microprocessors and Microcontrollers

	COURSE OUTCOMES	PSO	CL	KC	Allotted hrs
CO 1	To make the students understand the fundamentals of 8085. Students should understand the working of these	PSO7, PSO11	CL-U, Ap , C	KC-P	14

		PSO	CL	KC	
	systems and should be able to determine hardware and software.				
CO 2	Understand the concept of 8086 processor. To make the students should understand the working of these systems and should be able to determine hardware.	PSO7, PSO11	CL-U, Ap , C	KC-P	16
CO 3	Students should hardware and software interfacing with real time systems. They should further understand how to design any application based on these systems.	PSO7, PSO11	CL-U, Ap , C	KC-P	12
CO 4	To make the students understand the fundamentals of 8051 microcontroller. Students should understand the working of these systems and should be able to determine hardware and software.	PSO7, PSO11	CL-U, Ap , C	KC-P	12

INS6COR10 - Industrial Automation

	COURSE OUTCOMES	PSO	CL	KC	Allotted hrs
CO 1	To make the students understand the fundamentals of automation and various automation	PSO8	CL-U,Ap,C	KC-P	14
CO 2	Students should understand the working of these systems and should be able to determine hardware and software requirements of PLC. They should further understand how to design any application based on these systems.	PSO8	CL-U,Ap,C	KC-P	14
CO3	To understand the working of SCADA systems and should study the hardware requirements of it.	PSO8	CL-U,Ap,C	KC-P	14
CO 4	To familiarize the working of DCS systems and should be able to determine hardware and its application.	PSO8	CL-U,Ap,C	KC-P	12

INS6CBP01 - Analytical Instrumentation

	COURSE OUTCOMES	PSO	CL	KC	Allotted hrs
CO 1	To introduce the basic concept of qualitative and quantitative analysis of a given sample.	PSO4, PSO5	CL-U,An	KC-F	30
CO2	To study various spectroscopic techniques and its instrumentation.. To study the concept of separation science and its applications.	PSO4, PSO5	CL-U,An	KC-F	35
CO 3	Comprehend different types of Chromatography and its application.	PSO4, PSO5	CL-U,An	KC-F	25

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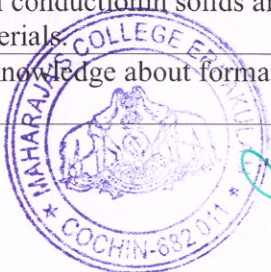MAHARAJA'S COLLEGE
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Choice based courses (B.Sc. physics)

PHY5CBP01 - Choice based course I- Optics and Photonics

CO	COURSE OUTCOME	PSO	CL	KC	Allotted hrs
CO1	To understand the nature of light - particle and wavenature of light on the basis if interference, diffraction, polarization, photoelectric effect, Compton effect	PSO5	U	C, F	12
CO2	To study the characteristic properties of light using the phenomenon of interference	PSO 5	U,Ap, An	C, F, P	12
CO 3	To study the theory of diffraction and polarization of light and their applications in devising optical elements	PSO 5	U, Ap, An	C, F, P	12
CO4	To understand the theory, construction and working of microscopes and telescopes	PSO 5	U, Ap, C	C, F, P	12
CO5	To understand the theory of lasing and the constructionand working of solid state lasers, gas lasers and semiconductor lasers	PSO5	U, An	C, F	12
CO6	To understand the theory and applications of holography, fiber optics and non linear optics	PSO 5	U, An, Ap	C, F	10
CO7	To understand and analyse different optical elements using matrix method of optics	PSO 5	U, An	C, F	10
CO8	To understand the major advances in optical phenomena like optical stability and self-focusing of light	PSO 5	A, An	C, F	10

PHY6CBP01 - Choice based course II- Material Science & Nanotechnology

	COURSE OUTCOME	PSO	CL	KC	Allotted hrs
CO1.	Understand and distinguish between various types ofmaterials viz Metals, ceramics, polymers etc.	PSO2, PSO5	U,An,	C,F	15
CO2	Understand and distinguish between crystalline, noncrystalline and micro crystalline solids and various types crystals	PSO5	U, An	C,F	15
CO3	Understand and distinguish between various types of crystalimperfections and to get knowledge about phase diagrams and laws of diffusion	PSO5	U, An, Ap	C,F	15
CO4	Understand the various mechanisms of electrical conductionin solids and nanomaterials	PSO2 & PSO5	U, An, Ap	C,F	15
CO5	To get knowledge about formation of thin films	PSO5	U, An	C, F	10

CO		PSO	CL	KC	Allotted hrs
CO6	To understand , differentiate and analyze various methodsfor the preparation and characterization of thin films and nanomaterials	PSO2 & PSO5	U, An, Ap	C,F	10
CO7	To analyse the reasons for the properties of nano materialsusing quantum mechanics.	PSO2 & PSO5	U, An, Ap	C,F	10

Complementary Physics for BSc Environmental Chemistry and Water Management(Model III)

Semester I

PHY1CMC01- Condensed matter physics Credits 3 (Theory 2+ Practical 1) Contact hours- 36

CO	COURSE OUTCOME	PSO	CL	KC	Allotted hrs
CO1	Understand different types of bonding in solids and the structure of crystalline solids.	PSO3	U F	C	8
CO2	Understand the properties of intrinsic and extrinsic semiconductors and p-n junctions.	PSO2, PSO3	U	C	8
CO3	Understand dielectric polarization of matter in electric fields, piezo-electricity, pyro-electricity and ferroelectricity.	PSO2	U F	C	8
CO4	Understand the origin of magnetism in materials and different types of magnetic materials. PSO2 U F,C	PSO2	U F	C	6
CO5	Understand the phenomenon of superconductivity and the applications of superconductors.	PSO2	U F	C	6

Semester II

PHY2CMC02- Electricity, Optics and Lasers

CO	COURSE OUTCOME	PSO	CL	KC	Allotted hrs
CO1	Understand the basics of current electricity and the role of resistors, inductors and capacitors in AC circuits.	PSO2	U, Ap	C, P	8
CO2	Understand the basics of interference of light and apply it to measure the wavelength of light.	PSO2	U, Ap	C, P	8
CO3	Understand the phenomenon of diffraction and apply it to a grating for wavelength determination.	PSO2	U, Ap	C, P	6
CO4	Understand the phenomenon of polarization of light by reflection, double refraction, selective absorption and scattering.	PSO2	U, Ap	C, P	6

CO		PSO2	U, Ap	C, P	8
CO5	Understand the principle of LASER and learn differe types of LASER s' and their applications.	PSO2	U, Ap	C, P	8

Semester III

PHY3CMC03 - Properties of Matter and Thermodynamics

CO	COURSE OUTCOME	PSO	CL	KC	
CO1	To understand the concept of heat , zeroth and first law of thermodynamics to get knowledge of various thermodynamic processes and thermal conductivity.	PSO5	U, An, Ap	C, F	16
CO2	To understand, analyse and apply the concepts and facts about the basic ideas behind different heat engines	PSO5	U, An, Ap	C, F	16
CO3	To understand, analyse and apply the concepts and facts of entropy, thermodynamic potentials, maxwell's thermodynamic relations and phase transitions.	PSO5	U, An, Ap	C, F	12
CO4	To understand and analyse some of the basic concepts of statistical physics.	PSO5	U, An, Ap	C, F	10

Semester IV

PHY4CMC04- Quantum Mechanics and Nuclear Physics

CO	COURSE OUTCOME	PSO	CL	KC	Allotted hrs
CO1	Understand the development of old quantum theory and explanation of blackbody radiation , photoelectric effect and Compton effect based on it.	PSO2	U,F	C	6
CO2	Understand the concept of matter waves and uncertainty principle.	PSO2	U, Ap	C,P	6
CO3	Understand atomic structure based on Bohr model and the origin of spectrum.	PSO2	U, Ap	C,P	8
CO4	Understand the basic concepts of quantum mechanics including Schrodinger equation, stationary states and its application to particle in a box.	PSO2	U, Ap	C,P	8
CO5	Understand the concept of spin of electron , spin orbit coupling .	PSO2	U	C	6

| CO		PSO2	U	C	6
CO6	Understand the origin of rotational and vibrational spectra of a linear diatomic molecule.	PSO2	U	C	6
CO7	CO7: Understand the structure and properties of nucleus, radio activity and fission and fusion of nuclei	PSO2	U	C	7
CO8	Understand the classification of elementary particles and their interactions.	PSO2	U	F,C	7

Complementary Electronics for BSc Physics-Instrumentation (Model III)

INS1CMP01- Basic Electronics

CO	COURSE OUTCOME	PSO	CL	KC	Allotted hrs
CO1	To introduce resistors, capacitors and inductors as examples of passive components	PSO 2	U,Ap	C	9
CO2	To learn techniques of solving circuits involving different active and passive elements. Understand the behavior of different circuits and their response using various circuit analysis tools and theorems	PSO 2	U,Ap	C	9
CO3	To introduce the students about the semiconductor devices. To introduce diodes as simple semiconductor components. To study the characteristics and operation of rectifiers and filter circuits	PSO 2	U,Ap	C	9
CO4	To introduce transistors as simple semiconductor components. To understand the operation of the various bias circuits of BJT.	PSO 2	U,Ap	C	9

INS2CMP02-Amplifiers and Oscillators

CO	COURSE OUTCOME	PSO	CL	KC	Allotted hrs
CO1	To study of transistor as an amplifier.	PSO 2;	U, Ap	C	9
CO2	To familiarize the students about the feedback amplifiers. To understand the effects of negative feedback on	PSO 2;	U, Ap	C	9

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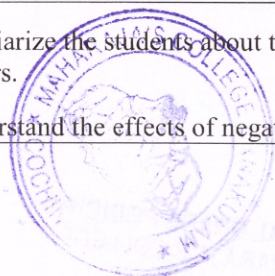
CO		PSO	CL	KC	Allotted hrs
	amplifier circuits. Observe the effect of negative feedback on different parameters of an amplifier and different types of negative feedback topologies.				
CO3	To familiarize the students about oscillators.	PSO 2;	U, Ap	C	9
CO4	Develop the ability to understand the design and working of FET amplifiers. To understand the operation of the various bias circuits of MOSFET and analyze and• design MOSFET bias circuits.	PSO 2;	U, Ap	C	9

INS3CMP03- Communication Electronics

CO	COURSE OUTCOME	PSO	CL	KC	Allotted hrs
CO1	To introduce students the concept and theory of signals and systems needed in telecommunication engineering fields. The fundamentals of basic communication system, types of noise affecting communication system and noise parameters.	PSO 2	U,Ap	C	14
CO2	To introduce students to various modulation and demodulation techniques of analog communication. To analyze different parameters of analog communication techniques.	PSO 2	U,Ap	C	15
CO3	Aim is to identify the number system and conversion. To familiarize the students about different modulation techniques.	PSO 2	U,Ap	C	12
CO4	To learn the basic elements of communication networks and its terminology. To know the mobile communication evolution of 2G, 3G and 3 GPP in detail.	PSO 2	U,Ap	C	13

INS4CMP04-Operating System and Python Programming

CO	COURSE OUTCOME	PSO	CL	KC	Allotted hrs
CO1	To introduce operating system as a resource manager, its evolutions and fundamentals. To help student understand concept of process and different management. To help student familiar with memory, file and I/O management policies.	PSO 2	U,Ap	C	14

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		PSO 2	U,Ap	C	14
CO2	To help student understand history and concept of Linux. To introduce bash programming and how it is used in different areas.				
CO3	To familiarize the students about python.. To introduce python syntax in detail.	PSO 2	U,Ap	C	10
CO4	Learn and understand the concepts of python in physics.	PSO 2	U,Ap	C	16

First core Practical courses for B.Sc. physics Instrumentation(Model III)

PHY1COR01- Methods of Physics Practicals

CO1. Apply and verify the theoretical concepts and facts in mechanics by laboratory experiments. PSO7, CL-Ap, KC-F, P

PHY2COR02- Properties of Matter Practicals

CO1. Apply and verify the theoretical concepts and facts in mechanics, electricity and electronics by laboratory experiments. PSO7, CL-Ap, KC-F, P

PHY3COR03 - Basic Electronics Practicals

CO1. Apply and verify the theoretical concepts and facts in mechanics and electronics by laboratory experiments. PSO7, CL-Ap, KC-F, P

PHY4COR04 - Electricity, Magnetism & Electrodynamics Practicals

CO1. Apply and verify the theoretical concepts and facts in mechanics, optics and electronics by laboratory experiments. PSO7, CL-Ap, KC-F, P
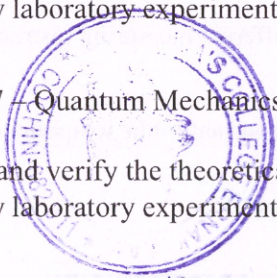
PHY5COR05 - Classical Mechanics Practicals

CO1. Apply and verify the theoretical concepts and facts in mechanics, optics and electricity by laboratory experiments. PSO7, CL-Ap, KC-F, P

PHY5COR06 - Thermal & Statistical Physics Practicals

CO1. Apply and verify the theoretical concepts and facts in optics, electricity, magnetism and electronics by laboratory experiments. PSO7, CL-Ap, KC-F, P

PHY5COR07 - Quantum Mechanics Practicals

CO1. Apply and verify the theoretical concepts and facts in optics, electricity and digital electronics by laboratory experiments. PSO7, CL-Ap, KC-F, P

PHY6COR09 - Nuclear & Particle Physics Practicals

CO1. Apply and verify the theoretical concepts and facts in optics, magnetism and electronics by laboratory experiments. PSO7, CL-Ap, KC-F, P

CO2. Understand the fundamentals of Python Programming to apply it for numerical solution. PSO6, CL-Ap, KC-C,P

PHY6COR10 – Numerical methods & Computational Physics

CO1. Apply and verify the theoretical concepts and facts in optics and electronics by laboratory experiments. PSO7, CL-Ap, KC-F, P

CO2. Understand the fundamentals of Python Programming to apply it for numerical solution. PSO6, CL-Ap, KC-C, P

PHY6COR11 - Condensed Matter Physics Practicals

CO1. Apply and verify the theoretical concepts and facts in optics and electronics by laboratory experiments. PSO7, CL-Ap, C, KC-F, P

CO2. Understand the fundamentals of Python Programming to apply it for numerical solution. PSO6, CL-Ap, KC-C, P

PHY6COR12 - Special Theory of Relativity & Astrophysics Practicals

CO1. Apply and verify the theoretical concepts and facts in electronics/digital electronics by laboratory experiments. PSO7, CL-Ap, C, KC-F, P

CO2. Understand the fundamentals of Python Programming to apply it for numerical solution. PSO6, CL-Ap, KC-C, P

2nd Core Practical Courses for BSc Physics-Instrumentation (Model III)

Semester I
INS1P01-Basic Instrumentation
CO1: To understand application of mechanical tools. PSO 4,9,12; CL-U, Ap ; KC-C, F, P
CO2: Ability to analyze the basic waveforms and different parameters. PSO 4,9,12; CL-U, Ap ; KC-C, F, P
CO3: Ability to study and analyze various theorems. PSO 4,9,12; CL-U, Ap ; KC-C, F, P

Semester II

INS2P02-Industrial Instrumentation
CO1: To train the students in the calibration and use of different measuring instruments. PSO 4, 5; CL-U, Ap ; KC- P

CO2: To train the students in measuring different process variables like temperature, pressure. PSO 4, 5; CL-U, Ap ; KC- P
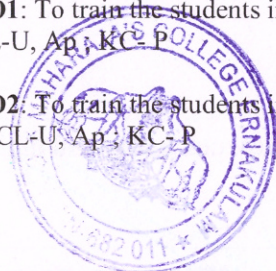
Semester III

INS3P03- Signal Conditioners
CO1: To impart knowledge of design considerations of analog signal conditioning of components. PSO 4,6, CL-U, Ap, An ; KC- P
CO2: Design an analog signal conditioning circuit to provide a range of desired output voltages in respond to a certain range of input voltages. PSO 6, 4; CL-U, Ap, An ; KC- P

Semester IV

INS4P04- Process Control Instrumentation
CO1: To make the students familiar with different process dynamics in Process industries and different control schemes. PSO 5, 6; CL-U, Ap ; KC- C, P
CO2: To train the students in measuring different process variables like displacement , pH, temperature. PSO 5, 6; CL-U, Ap ; KC- C, P

Semester VI
INS6P05-Microprocessor
CO1: To expose students to the operation of typical microprocessor trainer kit. PSO 11; CL-U, Ap, C ; KC- P
CO2: To prepare the students to be able to solve different problems by developing different programs. PSO 11; CL-U, Ap, C ; KC- P

INS6P06- INDUSTRIAL AUTOMATION
CO1: Students will be able to explain and apply the concept of electrical ladder logic and its relationship to programmed PLC instruction. PSO 8 ; CL-U, Ap, An, C ; KC- P
CO2: Students will be able to use timer, counter, and other intermediate programming functions.

Complementary Courses (Practical)
[Complementary Physics for BSc Env. Chemistry and Water Management (Model III

PHY1CP01
Semester I

CO1 To understand how to measure physical constants using basic measuring instruments like Measurements of length and depth using Vernier calipers Measurements of length and diameter using screw gauge Radius of a capillary tube - travelling microscope Density of a liquid - U-Tube and Hare's apparatus Viscosity of a liquid - variable pressure head Liquid lens - refractive index of glass using liquid of known refractive index Symmetric compound pendulum - radius of gyration and g, Spectrometer – familiarization of the instrument and measurement of angle of prism, Surface tension – capillary rise method, Beam balance – mass of a solid (sensibility method) PSO6 U,Ap,An P

PHY2CP02
Semester II

CO1 To understand how to measure physical constants using, Asymmetric Compound Pendulum - determination of K and g, Coefficient of viscosity – constant pressure head
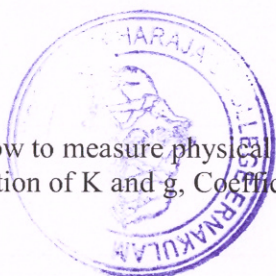
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(Poiseuille's method)., Spectrometer - refractive index of prism material, Torsion pendulum - rigidity modulus, Cantilever - pin & microscope – Young's Modulus, Laser - determination of wave length using calibrated ruler, Sonometer – verification of laws, Potentiometer - calibration of low range voltmeter PSO6 U,Ap,An P

CO2 To understand electronic components and design electronic experiments like I-V Characteristics of a semiconductor diode, Construction of half wave rectifier with and without C filter – ripple factor and voltage variation with load PSO4 U,Ap,An P

PHY3CPP03
Semester III

CO1 To understand how to measure physical constants using Cantilever – scale and telescope - determination of Young's modulus, Carey Foster's bridge - measurement of resistivity, Liquid lens - refractive index of liquid, Deflection and vibration magnetometer - m & Bh, Spectrometer – Prism – dispersive power, Potentiometer - calibration of low range ammeter, Non-uniform bending – Young's modulus — pin and microscope PSO6 U,Ap,An P.
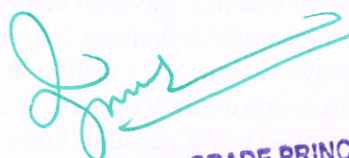
CO2 To understand electronic components and design electronic experiments like Full wave rectifier with and without C filter - voltage variation with load, Characteristics of Zener diode, Full wave rectifier with and without C filter - variation of ripple factor with capacitance value PSO4 U,Ap,An P

PHY4CP04
Semester IV

CO1 To understand how to measure physical constants using Uniform bending – Young's modulus - optic lever method, Torsion pendulum (Equal mass method) - rigidity modulus and moment of inertia, Fly wheel - moment of inertia, Static Torsion - rigidity modulus, Spectrometer - grating – determination of wavelength, Air wedge - diameter of wire Single slit – diffraction using laser, Circular coil - variation of magnetic field along the axis PSO6 U,Ap,An P

CO2 To understand electronic components and design electronic experiments like Gates – AND, OR, NOTverification of truth table using transistor and diodes, Regulated power supply – using IC's - LM7805,7905,7809,7909,7812,7912 PSO4 U,Ap,An P

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