

Programme Code:		B.Sc. PHY		Programme Title:	Bachelor of Physics	
Course Code:		23UPS101		Title	Batch:	2023-2026
Lecture Hrs./Week		6	Tutorial Hrs./Sem.	Core I: Properties of Matter	Semester:	I
					Credits:	3
Units	Content					Hrs
Unit I	GRAVITATION Kepler's law- Newton's law of gravitation – Density of earth -Gravitational Constant by Boy's method –Gravitational potential and field: Spherical shell – Solid sphere (inside and outside)- Circular disc – infinite plane, Compound pendulum – Earth Quakes – Seismic waves – Seismology – Determination of epicenter and focus – Modern application of seismology.					15
Unit II	ELASTICITY Modulus of Elasticity –Relation between the elastic constants - Determination of rigidity modulus: Static torsion method (Searle's method - scale and telescope) –Twisting couple on a cylinder- Strain energy in twisted cylinder - Torsional oscillation of a body – Determination of Rigidity modulus by Torsional pendulum (Dynamic torsion method) – Expression for the bending moment –Depression of the loaded end of a cantilever – Measurement of Young's modulus: Cantilever depression –Measurement of Young's modulus by bending of beam (Non uniform and uniform bending)- Searle's method to determine the rigidity modulus					16
Unit III	VISCOSITY Bernoulli's theorem – Applications: Velocity of efflux of a liquid (Torricellis theorem), Velocity of efflux of a gas - Poiseuille's equation for flow of a liquid through a horizontal capillary tube – Experimental determination of a viscosity of a liquid by Poiseuille's method – Motion in a viscous medium – Stokes law – Determination of coefficient of viscosity of a liquid : Stokes falling body viscometer , rotation viscometer – Comparison of viscosities (Ostwald Viscometer) – Variation of viscosity with temperature – Viscosity of gases : Rankine's method for air					16
Unit IV	SURFACE TENSION : Properties of surface tension –Excess pressure inside a liquid drop and soap bubble - Experimental study of variation of surface tension with temperature –Determination of surface tension, Jaeger's experiment, drop weight method and capillary rise method – Experiment to determine the interfacial tension between water and kerosene –Applications of surface tension. DIFFUSION AND OSMOSIS Diffusion –Fick's law – Graham's law of diffusion of gases – Osmosis and osmotic pressure – Experimental determination of Osmotic pressure (Berkeley and Hartley method) – Laws of Osmotic pressure –Osmosis and vapour pressure of a solution – Osmosis and boiling point of a solution					15

Unit V	SOUND Classification of sound : Musical sound and noise – Speech- Human voice – Human ear – Characteristic of Musical sound- Intensity of sound – Measurement of intensity of sound – Decibel – Bel – Phon (Definiton only) -Laws of transverse vibration of strings –Melde’s experiment – Resonance - Acoustics – Reverberation – Sabine’s Reverberation formula(qualitative analysis) – Determination of Absorption coefficient – Factors affecting Acoustics of Buildings –Requisites for Good Acoustics – Ultrasonics – Production of Ultrasonics : Piezo electric oscillator – Detection of Ultrasonics- Acoustic grating – Applications of Ultrasonics: Depth of the sea and medical applications	16
	Total Contact Hrs	78

Programme Code:	BSc	Programme Title:	Bachelor of Science	
Course Code:	23UPS202	Title	Batch:	2023-2026
		Core II: Thermal Physics	Semester:	II
Hrs/Week:	5		Credits:	5
Unit	Content			Hrs
I	KINETIC THEORY OF GASES Kinetic theory of gases – Concept of ideal or perfect gas – Kinetic model: Postulates of kinetic theory of gases – Expression for the pressure exerted by a gas- Estimation of rms speeds of molecules - Derivation of gas equation - Maxwell's law of distribution of velocities - Experimental verification - Degrees of freedom and Maxwell's law of equipartition of energy – Vander waal's equation of state - Critical constants-Quantum theory of specific heat : Specific heat of solids – Dulong and Petits law – Variation of specific heat of diatomic gases with temperature			13
II	TRANSMISSION AND RADIATION OF HEAT Conduction, convection and radiation – Coefficient of Thermal conductivity -Thermal diffusivity-Steady state- Lee's disc method of determining thermal conductivity of bad conductor-Searles method-Forbe's method - Radial and cylindrical flow of heat - Stefan's law and experimental verification - Determination of Stefan's constant - Blackbody - Properties of thermal radiation - Distribution of energy in the spectrum of a black body.			13
III	LOW TEMPERATURE PHYSICS Porous Plug experiment and theory - Cascade process - Liquefaction of Oxygen - Air (Linde's process) - Hydrogen (Cascade process) - Liquefaction of Helium - K.Onnes method - Helium I and Helium II - Production of low temperature - Conversion of magnetic temperature to Kelvin temperature - Adiabatic demagnetization			13
IV	THERMODYNAMICS I Zeroth law of thermodynamics – Quasistatic process – Concept and comparison of heat and work - First law of thermodynamics - Isothermal and Adiabatic process -isochoric process- isobaric process - Work done during Isothermal and Adiabatic process - Reversible and Irreversible process - Second law of thermodynamics - Carnot's reversible engine - Carnot's theorem			13
V	THERMODYNAMICS II Entropy – Change in entropy during reversible and irreversible process - Third law of thermodynamics - Temperature - Entropy diagram- entropy of perfect gas and zero point energy – Maxwell's thermo-dynamical relations – Helmoltz function – Gibb's function – Enthalpy -T-ds equation			13

	Total contact hours	65
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Programme Code:	BSC	Programme Title:	Bachelor of Science	
Course Code:	22UPS304	Title	Batch:	2022-2025
		Core IV: Mathematical Physics	Semester:	III
Hrs/Week:	5		Credits:	5

Unit	Content	Hrs
I	VECTORS Gradient of a scalar field – Line, Surface and Volume integrals – Divergence of a vector function – Curl of a vector function and its physical significance – Important vector identities – Gauss divergence theorem – Stokes theorem – Curvilinear co-ordinates – Cylindrical co-ordinates (r, θ) - Spherical polar co-ordinates (r, θ, Φ) – Grad, Divergence and curl in terms of curvilinear, cylindrical and spherical polar co-ordinates	13
II	MATRICES Matrix – Definition – Types of matrices – Rank of matrix – transpose matrix and its properties – Conjugate of a matrix and its properties – Conjugate transpose and its properties – Symmetric and Anti symmetric matrices – Hermitian and skew Hermitian - Characteristic equation of a matrix - Eigen values, Eigen vectors - Cayley Hamilton theorem – Dirac matrices	13
III	LAPLACE TRANSFORM Laplace transform – Properties of Laplace transforms – Problems – Inverse Laplace transform : Properties of Inverse Laplace transform – Convolution theorem – Evaluation of Inverse Laplace transforms by convolution	13

	theorem - Problems	
IV	GROUP THEORY Concept of a group - Abelian group - Generators of finite group - <i>Cyclic group</i> - Group multiplication table (Qualitative analysis) - Group of symmetry of a square - The Rearrangement theorem - Subgroups - Lagrange's theorem for a finite group - Cosets- Conjugate elements and classes - Product of classes - Complexes - Conjugate subgroups, Normal subgroups and factor groups - Isomorphism and Homomorphism - Permutation Groups	13
V	NUMERICAL METHODS Solution of algebraic and transcendental equations: The Bisection method - The iterative method - Method of false position - Newton-Raphson method - Solution of ODE: Taylor's series method - Euler's method - Runge Kutta II order method - Trapezoidal Rule - Simple problems	13

Programme Code:	BSC	Programme Title:	Bachelor of Science	
Course Code:	22UPS405	Title	Batch:	2022-2025
		Core V: Electricity & Magnetism	Semester:	IV
Hrs/Week:	5		Credits:	5
Unit	Content			Hrs
I	ELECTRIC FIELD AND POTENTIAL Concept of charge - Electric Field (E) - Potential difference (V) - Relation between E and V - Equipotential surfaces - Poisson's and Laplace equations - Potential and field due to an electric dipole - Potential and field due to a quadrupole - Potential and field due to uniformly charged disc - Potential due to two concentric spherical shells of charge - Potential energy due to charge distribution – dipole in an electric field.			13
II	CAPACITORS AND DIELECTRICS Capacitors - Parallel plate capacitor - Cylindrical capacitor - Spherical capacitor - Guard ring capacitor - Energy stored in a capacitor - Force of attraction between capacitor plates - Dielectric constant - Polar and nonpolar molecules - Polarisation of dielectric - Capacity of a parallel plate capacitor partially and completely filled with dielectric - Electric polarization vector P - Electric displacement vector D - Relation between D, E and P - Dielectric susceptibility and permittivity - Physical meaning of polarization – Mechanism of polarization			13
III	MAGNETOSTATICS AND MAGNETIC FIELD Magnetic effect of current - Definition of magnetic field vector - Lorentz force - Force on a current carrying wire - Magnetic flux - Gauss law in magnetostatics - Torque on a current carrying coil in uniform magnetic field - Potential energy of a current loop - Ballistic galvanometer - Deadbeat condition - Comparison of emfs and capacitances - Biot Savart law- field due to steady current in a long straight wire - Interaction between two long parallel wire carrying currents - Magnetic field along the axis of a circular coil - Field along the axis of a solenoid - Magnetic dipole - Ampere's law - Applications of ampere's law: long wire – parallel conductors – solenoid - toroid			13

IV	ELECTROMAGNETIC INDUCTION Faraday's laws of Electromagnetic induction - Deduction of Faraday's laws from Lorentz's force - Self inductance - Calculation of self inductance for a solenoid - Energy stored in magnetic field - Mutual inductance - Energy stored in two interacting circuits - DC circuits : Simple RL circuit - Growth and decay of current - RC circuit - Charging and discharging of a condenser - Ideal LC circuit - Series LCR circuit - Discharge of a condenser through inductance and resistance	13
V	MAXWELL'S EQUATIONS AND ELECTROMAGNETIC THEORY Basic equations - Types of current - Vacuum displacement current - Maxwell's equations - Maxwell's equations in free space - Electromagnetic waves in free space - Electromagnetic waves in isotropic non - conducting media - Refractive index - Impedence of dielectric media - Energy density of electromagnetic wave - Poynting theorem - Energy per unit volume.	13
Total contact hours		65

Programme Code:	BSC	Programme Title:	Bachelor of Science	
Course Code:	21UPS4N3	Title	Batch:	2021-2024
		Non-Major Elective II: Principles of Physics –II	Semester:	IV
Hrs/Week:	1		Credits:	2

Unit	Content	Hrs
I	Electric train – Leak proof battery –Hot air balloons – Remote control in TV –Superconductivity – <i>Nuclear reactors</i>	3
II	Photo chromic glasses – Exhaust silencer – Optical fibers – Radar and Sonar – Fluorescent Lamps – <i>Holograms – Touch screens</i>	2
III	<i>Earthquake measurement – Splitting of white light – GPS – Origin of Gravity – Use of Infrared spectroscopy – Static electricity</i> – Three pin electric plugs – Electric line tester	2
IV	<i>Refrigerants and their use in refrigerators</i> - Frost formation - <i>Air Cooler & Conditioner</i> - Black box in Planes - Speech synthesizers - <i>Lie detector - Pencil eraser</i> - <i>Bullet proof glass</i> - <i>Dry cleaning</i> - Aeroplane not affected by lightning - Mosquito mats - Unleaded Petrol and two wheelers - <i>Oil with Petrol for two wheelers</i>	3
V	<i>TFM on soap</i> - Cell phones - Cordless phones - Tubeless tyres - <i>Radial & Ordinary tyres</i> - Non linear editing - <i>Tear gas</i> - <i>Smell of Dust bin</i> - Biological Weapon - <i>Super Plasticizers in concrete</i> - <i>Super Computers</i> - <i>Computers Simulation</i> - <i>Artificial teeth</i> – <i>Aqualung</i> - Purity of Honey - Breath analyzers	3
	Total contact hours	13

Programme Code:	BSC	Programme Title:	Bachelor of Science	
Course Code:	21UPS508	Title	Batch:	2021-2024
		Core VIII: Classical Dynamics	Semester:	V
Hrs/Week:	5		Credits:	5
Unit	Content			Hrs
I	MECHANICS OF A PARTICLE Linear momentum - Angular momentum-Work- Power- Kinetic energy Conservative forces- Potential energy- Conservation theorem for linear momentum Conservation theorem for angular momentum - Conservation theorem for energy - Motion of a particle under time dependent applied force –Motion of a free electron in oscillating field - Motion of a particle under damping forces - Motion of a particle under central force – Application to Projectile and simple harmonic vibrations			13
II	MECHANICS OF SYSTEM OF PARTICLES Conservation theorem for a system of particle; Conservation theorem for linear momentum, angular momentum and energy - Constrained motion - Types of constraints with examples - Forces of constraints - Degrees of freedom - Generalized coordinates - Generalized notation for Displacement, Velocity, Acceleration, Momentum, Force and Potential - Limitations of Newton's Law			13
III	LAGRANGIAN FORMULATION Delta-Variation process - Hamilton's principle - Deduction of Lagrange's equations of motion from Hamilton's principle - Principle of virtual work - D'Alembert's principle - Deduction of Lagrange's equations by D'Alembert's principle for both conservative system and non-conservative system - Deduction of Hamilton's principle from D'Alembert's principle - Deduction of Newton's second law of motion from Hamilton's principle - Applications of Lagrange's equation: Linear harmonic oscillator, Simple pendulum, Compound pendulum.			13

IV	HAMILTONIAN FORMULATION OF MECHANICS View points of the new development - Phase space and the motion of systems - Hamiltonian - Hamilton's canonical equations of motion - Cyclic coordinates - Physical significance of H - Advantages of Hamiltonian approach - Deduction of canonical equations from variational principle - Applications of Hamilton's equations of motion; Simple Pendulum, Compound pendulum, Linear harmonic oscillator.	13
V	HAMILTON - JACOBI FORMULATION Canonical or contact Transformations: Point Transformation, Canonical Transformation, Generating Function (Four forms) - Advantage of Canonical Transformations - Hamilton Jacobi method - Harmonic Oscillator problem by Hamilton Jacobi method - Hamilton Jacobi equation for Hamilton's Characteristic function.	13
Total contact hours		65

Programme code:	BSC	Programme Title :	Bachelor of Science	
Course Code:	21UPS509	Title	Batch :	2021-2024
		Core IX: Relativity & Quantum Mechanics	Semester	V
Hrs/Week:	5		Credits:	5
Unit	Content			Hrs
I	SPECIAL THEORY OF RELATIVITY Galilean transformations and their limitations - Search for an absolute frame of reference: Michelson Morley experiment - Einstein's postulates and Lorentz transformations - Length contraction, Time dilation and Simultaneity – Variation of Mass with velocity - Mass-energy equivalence with experimental evidence			13
II	GENERAL THEORY OF RELATIVITY Relation between total energy, particle momentum and rest energy - Relativistic Doppler effect - Cerenkov radiation - World point and world line in Minkowski space - Inertial and gravitational mass - Principle of equivalence - Qualitative discussion of bending of light - <i>Precession of perihelion of mercury and gravitational red shift</i>			13
III	QUANTUM MECHANICS WAVE PROPERTIES OF PARTICLES de-Broglie waves – The de-Broglie wavelength – Expression for group velocity – Experimental study of matter waves : Davisson and Germer's experiment - Heisenberg's Uncertainty principle and its illustrations: Gamma ray microscope & Diffraction of a beam of electrons by a slit - Postulates of wave mechanics - Properties of wave function			13
IV	SCHRÖDINGERS EQUATION AND ITS APPLICATIONS Time dependent and Time independent forms - Particle in a box: Infinite Square well potential - Potential step - The barrier penetration problem - Linear Harmonic oscillator - The rigid rotator			13
V	QUANTUM THEORY OF HYDROGEN ATOM Schrödinger's equation for the Hydrogen atom - Separation of variables- Expression for the energy of the electron in the ground state – Significance of Quantum numbers : Principal Quantum number , Orbital Quantum number & Magnetic Quantum number - Electron probability density			13

Total contact hours	65
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Programme Code:	BSC	Programme Title:	Bachelor of Science	
Course Code:	21UPS510	Title	Batch:	2021-2024
		Major Elective I: Basic Electronics & Circuit System	Semester:	V
Hrs/Week:	5		Credits:	5

Unit	Content	Hrs
I	DC CIRCUITS AND ALTERNATING CURRENTS DC Circuits: Current, Voltage, Resistance, Ohm's Law, Joule's Law, Resistors and Batteries - Series and Parallel Circuits - Networks - Kirchoff Rules - Thevenin's Theorem - Norton's Theorem - Maximum power transfer theorem – Proportional Voltage and Current formula - Ammeter, Voltmeter, Ohmmeter and Multimeter (Basic ideas) - Alternating currents: Frequency, Amplitude and Phase - RMS value and Power - Capacitance and Inductance - Transformer	13
II	SEMICONDUCTOR DEVICES AND CIRCUITS Semiconductor and Energy bands - Doped Semiconductor - PN Junction diode and Zener diode - Characteristics - Half wave, Full wave and Bridge rectifiers – Capacitance filter-Two pin regulated power supply - Voltage doublers - Clippers and Clampers - Transistor and action - Common base and Common emitter Configurations - Relations between α and β - Load line and Operating point - Stability - Voltage divider Self bias - JFET and its characteristics	13

III	AMPLIFIERS & OSCILLATORS Principle of amplification - Classification of amplifiers - Common emitter single stage amplifier and frequency response - Multistage amplifiers (Basic ideas) - Concept of feedback and Effect of negative feed back (qualitative) - Barkhausen criterion - Basic Oscillatory circuit and Classification of oscillators - Hartley, Colpitts and Phase shift Oscillators (Circuit operations)	13
IV	OPERATIONAL AMPLIFIER Typical stages of an Op Amp - Ideal Op Amp and characteristics - Input offset voltage, Offset current, Bias current and Slew rate (Definitions) - Inverting Op Amp - Noninverting Op Amp - Differential Op Amp - Scale and Phase changers - Adder and Averager – Subtractor, Differentiator and Integrator	13
V	OPTOELECTRONIC DEVICES Optical radiation - Flux and illumination - Structure, variation of resistance & speed response of a Photo detector - Photovoltaic cells - Photodiodes - Phototransistors - Light beam detector - Electronic slave flash control - Window detector - LED: Bar graph display, drivers and LED arrays - <i>Optically coupled isolator (Basic ideas)</i>	13
Total contact hours		65

Programme Code:	BSC	Programme Title:	Bachelor of Science	
Course Code:	21UPS511	Title	Batch:	2021-2024
		Major Elective II: Digital Circuit systems	Semester:	V
Hrs/Week:	5		Credits:	5
Unit	Content			Hrs
I	NUMBER SYSTEMS AND CODES Binary numbers - 1's and 2's complement - Addition - Subtraction - Multiplication - Division - Binary to Decimal conversion and vice versa - Octal numbers - Octal to Binary conversion and vice versa - Hexadecimal numbers - Hexadecimal to Binary conversion and vice versa - BCD - ASCII - Excess 3 code - Gray code LOGIC GATES OR, AND and NOT gates - NAND and NOR gates - Universal building blocks - XOR and XNOR gates			13
II	THEOREMS OF BOOLEAN ALGEBRA Demorgan's theorems - Laws and theorems of Boolean algebra - Simplification of Boolean expressions - Karnaugh map - Pairs, quads and octets - Sum of product method and simplifications - Don't care conditions - Product of sum method and simplifications ARITHMETIC PROCESSING CIRCUITS Half and full adders - Half and full subtractors - Parallel binary adder and subtractor			13
III	DATA PROCESSING CIRCUITS Multiplexers - Demultiplexers - 1 - of - 16 decoder - BCD to decimal decoder - Seven segment decoders - Encoders FLIP FLOPS AND SHIFT REGISTERS RS Flip Flop - D Flip Flop - Edge triggering - JK and Master slave Flip Flop - Serial in serial out - Serial in parallel out - Parallel in serial out - Parallel in parallel out shift register			13

IV	COUNTERS Asynchronous Mod 8 up and down counters - Decoding gates - Synchronous Mod 8 up and down counters - Mod 3, Mod 5, and Mod 10 counters - Presetable counter - Digital clock D/A and A/D CONVERSIONS Variable resistor network - Binary ladder - D/A Converter - A/D converter	13
V	SEMICONDUCTOR MEMORIES Memory addressing - ROM's, PROM's and EPROM's - Expansion of ROM capacity - Static and Dynamic RAM's IC TECHNOLOGY Integrated circuits - Resistors, Diodes and BJT'S in IC's - Design rules for monolithic circuit - Fabrication of monolithic IC's	13
Total contact hours		65

Programme Code:		BSC	Programme Title:		Bachelor of Science	
Course Code:		21UPS5S3	Title		Batch:	2021-2024
			Skill based Elective III: Mechanical Measurements		Semester:	V
Hrs/Week:		1			Credits:	2
Unit		Content				Hrs
I		LAWS OF PHYSICS AND CHEMISTRY Quantum Mechanics – Electronic structure of Atom – Molecular orbitals and Covalent bonds – Molecular Interactions – Strong and Weak interaction – Thermodynamics – Entropy and Enthalpy – <i>Free energy of a system</i>				3
II		MOLECULAR ALPHABETS OF LIFE Introduction to the molecular structure and function of Proteins, Nucleic acids, Carbohydrates and Lipids.				2
III		BIOMOLECULAR SEPARATION TECHNIQUES Chromatography: Column, Thin Layer, Ion exchange, Molecular exclusion and Affinity Chromatography – Electrophoresis – Gel Electrophoresis.				2
IV		PHYSIOCHEMICAL TECHNIQUES Ultra centrifugation – Viscosity – Light scattering measurements – Different types of Light microscopy – Basics of TEM, SEM – Introduction to X-ray crystallography and NMR.				3
V		BIOMECHANICS AND NEURO-BIOPHYSICS Mechanical properties of muscles – Biomechanics of cardiovascular system – The nervous system – Physics of membrane potentials – Sensory mechanisms – The Eye – <i>Physical aspects of hearing.</i>				3
Total contact hours						13

Programme Code:	BSC	Programme Title:	Bachelor of Science	
Course Code:	21UPS612	Title	Batch:	2021-2024
		Core X: Mathematical Physics	Semester:	VI
Hrs/Week:	5		Credits:	5
Unit	Content			Hrs
I	VECTORS Gradient of a scalar field – Line, Surface and Volume integrals – Divergence of a vector function – Curl of a vector function and its physical significance – Important vector identities – Gauss divergence theorem – Stokes theorem – Curvilinear co-ordinates – Cylindrical co-ordinates (r, θ) - Spherical polar co-ordinates (r, θ, Φ) – Grad, Divergence and curl in terms of curvilinear, cylindrical and spherical polar co-ordinates			13
II	MATRICES Matrix – Definition – Types of matrices – Rank of matrix – transpose matrix and its properties – Conjugate of a matrix and its properties – Conjugate transpose and its properties – Symmetric and Anti symmetric matrices – Hermitian and skew Hermitian - Characteristic equation of a matrix - Eigen values, Eigen vectors - Cayley Hamilton theorem – <i>Dirac matrices</i>			13
III	LAPLACE TRANSFORM Laplace transform – Properties of Laplace transforms – Problems – Inverse Laplace transform : Properties of Inverse Laplace transform – Convolution theorem – Evaluation of Inverse Laplace transforms by convolution theorem - Problems			13
IV	GROUP THEORY Concept of a group - Abelian group - Generators of finite group - <i>Cyclic group</i> - Group multiplication table (Qualitative analysis) - Group of symmetry of a square - The Rearrangement theorem - Subgroups - Lagrange's theorem for a finite group - Cosets- Conjugate elements and classes - Product of classes - Complexes - Conjugate subgroups, Normal subgroups and factor groups - Isomorphism and Homomorphism - Permutation Groups			13

V	NUMERICAL METHODS Solution of algebraic and transcendental equations: The Bisection method - The iterative method - Method of false position - Newton-Raphson method - Solution of ODE: Taylor's series method - Euler's method - Runge Kutta II order method - Trapezoidal Rule - Simple problems	13
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Programme Code:		BSC	Programme Title:		Bachelor of Science
Course Code:		21UPS614	Title	Batch:	2021-2024
			Core XII: Condensed Matter Physics & Statistical Mechanics	Semester:	VI
Hrs/Week:		5		Credits:	5
Unit	Content				Hrs
I	BONDING IN SOLIDS Bonding in solids - Ionic bonding - Covalent bond - Metallic bond - Intermolecular bonds - Dispersion bonds - Dipole bonds - Hydrogen bonds (Formation and properties) CRYSTAL PHYSICS Lattice points and space lattice - Unit cells and lattice parameters - Crystal systems - Symmetry elements in crystals - The Bravais lattices - Metallic crystal structures - Relation between the density of crystal material and lattice constant in a cubic lattice - Other cubic structures - Miller Indices - Reciprocal lattice (Construction only)				13

II	ELECTRICAL PROPERTIES OF SOLIDS Classical free electron theory of metals and its draw backs - Quantum theory of free electrons - Joule's law - Hall effect - Experimental determination of Hall coefficient - Band theory of solids - Electron in a periodic field of a crystal (the Kronig - Penney model) - Brillouin zones MAGNETIC PROPERTIES OF SOLIDS Different types of magnetic materials - Langevin's Classical theory of diamagnetism - Langevin's and Weiss theory of paramagnetism - Weiss molecular field theory of ferromagnetism - Domain theory of ferromagnetism - Antiferromagnetism - Ferrimagnetism	13
III	SUPERCONDUCTIVITY Properties of superconductors - Effects of magnetic field - Persistent current - Critical current - The Meissner effect - Isotope effect - Penetration depth - Type I and Type II superconductors - Electronic specific heat - Energy gap measurements - BCS theory - Josephson tunneling (simple ideas only) - High temperature superconductors - <i>Applications of superconductivity (simple ideas only)</i>	13
IV	CLASSICAL STATISTICAL MECHANICS Phase space of a microscopic particle - Density of quantum states of energy of a particle - Volume occupied by a quantum state - Isolated system - Statistical equilibrium - Statistical postulates - Distribution function, entropy and probability - Maxwell - Boltzmann statistics and its application - Total internal energy - Specific heat at constant volume - Speed distribution - Most probable speed, average, root mean square speeds – Doppler broadening of spectral lines	13
V	QUANTUM STATISTICAL MECHANICS Bose-Einstein energy distribution - Basic postulates - B-E energy distribution function - B-E energy distribution law for continuous variation of energy - Planck's law of radiation - Fermi - Dirac energy distribution - Basic postulates - Energy distribution function - Fermi energy - Energy distribution curve - Expression for the Fermi Energy for electrons in a metal - Fermi temperature and Fermi velocity - Thermionic emission - Richardson Dushman equation – <i>Comparison of M-B, B-E and F-D statistics</i>	13

Programme code:	BSC	Programme Title :	Bachelor of Science	
Course Code:	21UPS615	Title	Batch :	2021-2024
		Microprocessor Mechanisms & Programming in C	Semester	VI
Hrs/Week:	5		Credits:	5
Unit	Content			Hrs
I	MICROPROCESSOR ARCHITECTURE AND PROGRAMMING Organization of a Microcomputer system – Architecture of the 8085 - Microprocessor instruction set and computer languages - Overview of the 8085 instruction set: Data transfer, Arithmetical, Logical, Branch, Stack, I/O & Machine control groups - Addressing modes - Programming the 8085: The programming process - The stack and subroutines - Simple programming examples			13
II	INTERFACING MEMORY AND I/O DEVICES Address space partitioning - Data transfer schemes - Programmed data transfer: Synchronous transfer - Asynchronous transfer - Interrupt driven data transfer - Multiple interrupts - Enabling, disabling and masking of interrupts - Direct Memory Access data transfer APPLICATIONS OF MICROPROCESSOR Temperature monitoring system (Brief description) - Closed loop process control: The process of growing synthetic Quartz (Qualitative ideas only)			13
III	INTRODUCTION TO C Basic Structure of C Programs - Character set - Key words and Identifiers - Constants - Variables - Data types – Declaration of variables – Assigning values to variables – Defining symbolic constants - Arithmetic operators - Relational operators - Logical operators - Assignment operators - Increment and decrement operators - conditional operators - Precedence of operators - Formatted input & output statements			13
IV	CONTROL STRUCTURES, ARRAYS & STRINGS Simple if - if...else - Nesting of if...else - else if ladder - Switch - while - do...while - for statements - Declaration and initialization of one & two dimensional arrays - Declaring and initializing string variables - String handling functions			13

V	FUNCTIONS, STRUCTURES AND POINTERS Definition of functions - Return values and their types - Category of functions: No arguments and no return values - Arguments but no return values - Arguments with return values - Recursion - Defining a structure - Declaring structure variables - Accessing structure members - Structure initialization - Declaring and initializing pointers - Pointers as function arguments - Pointers and structures	13
Total contact hours		65

Programme Code:	BSC	Programme Title:	Bachelor of Science	
Course Code:	21UPS6S5	Title	Batch:	2021-2024
		Skill based Elective II: Environmental Instrumentation	Semester:	VI
Hrs/Week:	1		Credits:	2
Unit	Content			Hrs
I	TEMPERATURE MEASUREMENTS Temperature scales - The ideal gas - Thermometer - Temperature measurement by mechanical effects - Temperature measurements by electrical effects : Electrical resistance thermometer - Thermistors - Thermoelectric effects - Quartz-crystal thermometer - Liquid crystal thermography			3
II	RADIATION MEASUREMENTS Radiation pyrometers – Blackbody conditions – Radiation reactive elements – Total radiation pyrometers – Infrared pyrometers – Optical pyrometers			3
III	THERMAL MEASUREMENTS Detection of thermal radiation – Measurement of emissivity – Reflectivity and Transmissivity measurements – Solar radiation measurements			2
IV	NUCLEAR RADIATION MEASUREMENTS			2

	Detection of Nuclear radiation – Geiger Muller Counter – Ionisation chambers – The Scintillation counter – Neutron detection.	
V	AIR POLLUTION SAMPLING AND MEASUREMENTS Units of pollution measurements – General air sampling train- gas sampling techniques – Sulfur dioxide measurements – Combustion products measurements – Opacity measurements	3



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