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LESSON PLAN
2023-2024

DEPARTMENT OF PHYSICS

(UG & PG – Even Semester)

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LESSON PLAN
2023-2024

Class : I B.Sc Physics **Semester : II**
Sub. Code : 23OUPH21
Title of the Paper: Heat, Thermodynamics and Statistical Physics **Total Hours: 60 Hours**

Month	Unit	Description of the Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher Signature
December	I	**CALORIMETRY:** specific heat capacity – specific heat capacity of gases CP& CV– Meyer's relation – Joly's method for determination of CV – Regnault's method for determination of CP **LOW TEMPERATURE PHYSICS:** Joule-Kelvin effect – porous plug experiment – Joule- Thomson effect – Boyle temperature – temperature of inversion – liquefaction of gas by Linde's Process – adiabatic demagnetisation.	12	Chalk & Talk	E. Chris Monica
January	II	**THERMODYNAMICS-I:** zeroth law and first law of thermodynamics – P-V diagram – heat engine – efficiency of heat engine – Carnot's engine, construction, working and efficiency of petrol engine and diesel engines – comparison of engines.	12	Chalk & Talk	
February	III	**THERMODYNAMICS-II:** second law of thermodynamics – entropy of an ideal gas – entropy change in reversible and irreversible processes – T-S diagram –thermodynamical scale oftemperature – Maxwell's thermodynamical relations –Clasius-Clapeyron's equation (first latent heat equation) – third law of thermodynamics – unattainability of absolute zero – heat death.	12	Chalk & Talk	E. Chris Monica
March	IV	**HEAT TRANSFER:** modes of heat transfer: conduction, convection and radiation.*Conduction*: thermal conductivity – determination of thermal conductivity of a good conductor by Forbe's method – determination of thermal conductivity of a bad conductor by Lee's disc method. *Radiation*: black body radiation (Ferry's method) – distribution ofenergy in black body radiation – Wien's law and Rayleigh Jean's law –Planck's law of radiation – Stefan's law – deduction of Newton's law of cooling from Stefan's law.	12	Chalk & Talk	
April	V	**STATISTICAL MECHANICS:** definition of phase-space – microand macro states – ensembles –different types of ensembles – classical and quantum Statistics – Maxwell-Boltzmann statistics – expression for distribution function – Bose-Einstein statistics – expression for distribution function – Fermi-Dirac statistics –expression for distribution function – comparison of three statistics.	12	Chalk & Talk	E. Chris Monica

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LESSON PLAN
2023-2024

Class : I B.Sc Physics **Semester : II**
Sub. Code : 23OUPHSEC3 **Total Hours : 30 Hours**
Title of the Paper: Electricity

Month	Unit	Description of the Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher Signature
December	I	**Electrostatics:** Electric field and flux – Gauss law-Derivation of Coulomb's law from Gauss law-Differential form(Maxwell equation)-Field due to a uniformly charged sphere –Coloumb's theorem – Mechanical force on the surface of a charged conductors –Potential-Electric potential –Potential due to a point charge-equipotential surface-relation between field and potential-electric potential energy.	6	Chalk & Talk	
January	II	**Current electricity :**Current –Current density-Expression for current density –Resistance and resistivity-Kirchhoff's laws –Application to Wheat stone's network –Carey foster's bridge – Determination of resistivity and temperature coefficient of resistance - Potentiometer –measurement of potential and calibration of voltmeter and Ammeter.	6	Chalk & Talk	
February	III	**Capacitors:** Introduction –Concept of capacitance – capacitance of an isolated spherical conductor –parallel plate capacitor with a dielectric- Dielectric strength.	6	Chalk & Talk	
March	IV	**Alternating currents :**Introduction –Impedance ,Reactance and Admittance-Alternating voltage applied across a resistance –Alternating voltage applied across an inductance- Alternating voltage applied across a capacitance.	6	Chalk & Talk	
April	V	**Thermo electricity:** Introduction –Seebeck effect-variation of thermo - emf with temperature –Peltier effect –Explanation of Seebeck and Peltier effect-Peltier coefficient –Thomson effect and its prediction -EMF in a thermocouple.	6	Chalk & Talk	

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Class : I B.Sc Physics
Sub. Code : 23OUPHSECN2
Title of the Paper: Astrophysics

LESSON PLAN
2023-2024

Semester : II
Total Hours : 30 Hours

Month	Unit	Description of the Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher Signature
Dec	I	**TELESCOPES:** Optical telescopes – magnifying power, brightness, resolving power and f/a ratio – types of reflecting and refracting telescopes – detectors and image processing – radio telescopes –Hubble space telescope.	6	Chalk & Talk	
January	II	**SOLAR SYSTEM:** Bode's law of planetary distances – meteors,meteorites, comets, asteroids – Kuiper belt – Oort cloud – detection of gravitational waves – recent advances in astrophysics	6	Chalk & Talk	
February	III	**ECLIPSES:** types of eclipses – solar eclipse – total and partial solareclipse – lunar eclipse – total and partial lunar eclipse – transits. **THE SUN:** physical and orbital data – solar atmosphere – photosphere– chromosphere – solar corona – prominences – sunspots – 11yearsolar cycle – solar flares	6	Chalk & Talk	
March	IV	**STELLAR EVOLUTION:** H-R diagram – birth & death of low mass, intermediate mass and massive stars – Chandrasekhar limit – whitedwarfs – neutron stars – pulsars – black holes – supernovae. **GALAXIES:** classification of galaxies – galaxy clusters –interactionsof galaxies, dark matter and super clusters – evolving universe.	6	Chalk & Talk	
April	V	**ACTIVITIES IN ASTROPHYSICS:** (i) Basic construction of telescope (ii) Develop models to demonstrate eclipses/planetary motion (iii) Night sky observation (iv) Conduct case study pertaining to any topic in this paper Visit to any one of the National ObservatoriesAny three activities to be done compulsorily.	6	Chalk & Talk	

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LESSON PLAN
2023-2024

Class : II B.Sc Physics | **Semester : IV**
Sub. Code : 22OUPH41 | **Total Hours : 60 Hours**
Title of the Paper: Optics and Spectroscopy

Month	Unit	Description of the Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher Signature
December	I	**Geometrical optics:** Introduction-Aberration-Spherical aberration-Chromatic Aberration- Chromatic Aberration in a Lens-Dispersion by a prism-Refraction through a prism-Angular Dispersions-Dispersive power-Angular and Chromatic Dispersions-Achromatic Combination of prisms-Deviation without Dispersion-Dispersion without Deviation-Direct vision Spectroscope -Huygens Eyepiece-Ramsden Eyepiece-Comparison of Ramsden Eyepiece with Huygens Eyepiece.	12	Chalk & Talk	P.R.L.
January	II	**Interference:** Introduction- Condition for interference- Techniques of obtaining interference-Thin Flim- interference due to reflected light-conditions for maxima and minima-variable thickness wedge shaped flim- determination of the wedge angle-Newton's rings- Condition for Bright and Dark rings - Michelson's interferometer (Construction and Working).	12	Chalk & Talk	
February	III	**Diffraction:** Introduction-Huygens-Fresnel theory-Rectilinear propagation of light-Zone Plate- Action of a Zone plate for an incident spherical wave front-Fresnel and Fraunhoffer types of Diffraction-Diffraction at a circular aperture- Fraunhoffer diffraction at a single slit- Fraunhoffer Diffraction at a circular aperture - Plane Diffraction Grating – Determination of wavelength of a spectral line using the transmission grating.	12	Chalk & Talk	P.R.L.
March	IV	**Polarization:** Introduction-Double refraction –Huygen's theory of double refraction in uniaxial crystals- Nicol prism-Plane,circularly and elliptically polarised light-Quarter wave plate-Half wave plate-production and deduction of plane circularly and elliptically polarised light-Fresnel's theory of Optical rotation-Laurent's Half-shade polarimeter.	12	Chalk & Talk	
April	V	**Spectroscopy:** Infrared spectroscopy-Sources and deductors-uses-Ultraviolet Spectroscopy-Raman Effect-Experimental study of Raman Effect- Quantum theory of Raman Effect-Applications-Nuclear Magnetic Resonance- Nuclear Quadrupole Resonance.	12	Chalk & Talk	P.R.L.

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LESSON PLAN
2023-2024

Class : III B.Sc Physics
Sub. Code : 21P61 **Semester : VI**
Title of the Paper: Solid state physics
Total Hours : 60 Hours

Month	Unit	Description of the Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher Signature
December	I	**Interatomic force & bonding in solids:** **Interatomic force:** Introduction – Force between atoms-Cohesion of Atoms and Cohesive energy-calculation of cohesive energy. **Bonding in solids:** Ionic Bonding –Bond energy of NaCl Molecule-Calculation of Lattice energy of Ionic crystal- The Born –Haber cycle –Properties of Ionic solids –Examples of Ionic solids –Covalent bond –Metallic bond –Hydrogen bond.	12	Chalk & Talk	
January	II	**Crystal physics:** Introduction –Lattice points and space lattice – Unit cells and Lattice parmeters-Crystal systems-Metallic crystal structures for SC, BCC, & FCC structures - Other cubic crystal structure - Miller Indices & important features of Miller Indices. **X-ray diffraction &diffraction method:** Bragg's law – Derivation of Bragg's equation.	12	Chalk & Talk	
February	III	**Magnetism in solids:** Magnetic Terminology –Types of Magnetism – Dia magnetism -(Langevin's classical theory)-Paramagnetism –(Langevin's classical theory)-Ferro magnetism-Weiss theory-concepts of Domains and Hysteresis- Anti Ferro magnetism-Ferri magnetism.	12	Chalk & Talk	
March	IV	**Super conductivity:** Introduction –Electrical Resistivity –Perfect Diamagnetism or Meissner Effect – Super currents and Critical Temperature -Type-I –Type-II Superconductors-High temperature Ceramic Super Conductors-Applications	12	Chalk & Talk	
April	V	**Semi conductors:** Introduction –Pure or Intrinsic Semiconductors – Impurity or Extrinsic Semiconductor –Drift velocity, Mobility and conductivity of intrinsic semiconductors-Carrier concentration and Fermi level for intrinsic semiconductors- Carrier concentration and Fermi level for extrinsic semiconductors	12	Chalk & Talk	

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Class : III B.Sc Physics
Sub. Code : 21P62

LESSON PLAN
2023-2024

Title of the Paper: Spectroscopy

Semester : VI

Total Hours : 60 Hours

Month	Unit	Description of the Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher Signature
December	I	**Spectra of atoms**Angular Momentum of Many Electron Atoms -Normal Zeeman effect-Anomalous Zeeman Effect-Paschen-Bach Effect-Influence of Nuclear Spin-Hyperfine Structure-Stark Effect-Rydberg Atoms-Lamb Shift-Characteristic X-Ray Spectra-Moseley's Law.	12	Chalk & Talk	E. Chris Monica
January	II	**Rotation of molecules** Classification of molecules – Interaction of radiation with rotating molecule – Rotational spectra of rigid Diatomic molecule – Isotope effect in Rotational spectra – Intensity of Rotational lines – Non-rigid rotator – Vibrational excitation effect – Linear polyatomic molecules – Symmetric top molecules - Asymmetric top molecules.	12	Chalk & Talk	E. Chris Monica
February	III	**Infrared spectroscopy:**Introduction-Vibrational Energy of a Diatomic Molecule -Infrared Selection rules-Vibrating Diatomic Molecule-Diatomic Vibrating Rotator-Asymmetry of Rotation-Vibration Band- rotation – Vibrations of polyatomic molecules - More about anharmonicity - Fermi Resonance.	12	Chalk & Talk	
March	IV	**Raman spectroscopy:** Introduction- Theory of Raman Scattering-Classical theroy - Quantum theroy of Raman scattering - Rotational Raman Spectra- Vibrational Raman Spectra-Mutual Exclusion Principle -Raman Microscopy.	12	Chalk & Talk	E. Chris Monica
April	V	**Electronic spectra of Diatomic molecules** Introduction –Vibrational Coarse Structure- Franck-Condon Principle- Intensity of Vibrational Electronic Spectra- Rotational Fine Structure of Electronic- Vibration Spectra- Photoelectron Spectroscopy.	12	Chalk & Talk	

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LESSON PLAN

2023-2024

Class : III B.Sc Physics **Semester : VI**
Sub. Code : 21PE6A **Total Hours : 60 Hours**
Title of the Paper: Theoretical Physics

Month	Unit	Description of the Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher Signature
December	I	Classical Mechanics Conservative Forces-Conservation theorem for energy of a particle-Mechanics of a system of particles-Degrees of Freedom – Constraints- Types of Constraints -Generalized co-ordinates- Transformation Equations - D'Alembert's Principles-Lagrangian Functions-Lagrange's Equation of Motion - Derivation of Lagrange's Equation of Motion -Application of Lagrange's Equation- Simple Pendulum – Compound Pendulum - The Atwood's Machine - The Hamiltonian Function H - Hamiltonian equation with derivation.	12	Chalk & Talk	P.R.L.
January	II	Statistical Mechanics Microscopic and Macroscopic descriptions-Ensembles-Phase space-Micro and Macro states- Thermodynamic probability- Boltzmann's theorem on entropy and probability – Derive the Boltzmann relation connecting entropy and Probability-Fundamental postulates of statistical mechanics Maxwell-Boltzmann distribution law-Application of Maxwell-Boltzmann distribution law to an ideal gas-Maxwell-Boltzmann velocity distribution law.	12	Chalk & Talk	
February	III	Quantum Statistics of particles Introduction-Quantum statistics of identical particles - Bose-Einstein distribution law-Application of B.E Statistics-Planck's law of radiation-deduction-Wien's and Rayleigh-Jean's law-Fermi Dirac Distribution Law – Application of Fermi Driac Statistics-Comparision of three statists.	12	Chalk & Talk	P.R.L.
March	IV	**Wave Mechanics** Introduction- The De-Broglie wavelength- Davisson and Germer's Experiment- G.P.Thomson's experiment- Wave velocity of De-Broglie waves- Group velocity of De- Broglie waves- Expression for Group velocity- Relation between group velocity and wave velocity-Heisenberg's Uncertainty principle.	12	Chalk & Talk	P.R.L.
April	V	Relativity Frames of reference-Galilean transformation equation-Michelson Morley experiment-Postulates of Special theory of Relativity-Lorentz transformation equations-Derivation of the Lorentz transformation equations - Einstein's Mass- Energy Relation- Relation between the total energy, rest energy and the Momentum.	12	Chalk & Talk	

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LESSON PLAN
2023-2024

Class : III B.Sc Physics
Sub. Code : 21SEP61
Title of the Paper: Introduction to Microcontrollers 8051

Semester : VI
Total Hours: 60 Hours

Month	Unit	Description of the Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher Signature
December	I	**Introduction to Microcontrollers** Introduction – Microcontrollers and Microprocessors– History of Microcontrollers and Microprocessors – Embedded Versus External Memory Devices- 8-bit and 16-bit Microcontrollers-CISC and RISC and Processors- Harvard and Von Neumann Architectures- Commercial Microcontroller Devices .	12	Chalk & Talk	S.
January	II	**Unit: II** **8051 Microcontrollers** Introduction- MCS -51 Architecture -Registers in MCS-51- General-purpose or working Registers – Stack pointer and program counter – Special Function Registers (SFR).	12	Chalk & Talk	K.
February	III	**Unit:III** **8051 Pin Description, Connections, I/O Ports and Memory Organization** 8051 Pin Description-8051 Connections -8051 Parallel I/O Ports-Memory Organization.	12	Chalk & Talk	P. R
March	IV	**MCS-51 Addressing Modes and Instructions** 8051 Addressing Modes- MCS-51 Instruction Set-8051 Instructions and Simple Programs- Using Stack Pointer.	12	Chalk & Talk	P. R
April	V	**8051 Assembly Language Programming Tools** 8051 Assembly Language Programming – 8051 assembler – 8051 programming Template - Development Systems and Tools – Software Simulators of 8051.	12	Chalk & Talk	P. R K.

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LESSON PLAN
2023-2024

Class : III B.Sc Physics
Sub. Code : 214VE6
Title of the Paper: Value Education

Semester : VI

Total Hours : 30 Hours

Month	Unit	Description of the Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher Signature
December	I	Value Education – Significance of values – Classification of value- Need of value education – values and their individuality sympathy, empathy, forgiveness, contentment, inner peace mindfulness. Value Education Vs Moral Education. Ideologies of Great Philosophers- Socrates, Aristotle and Plato.	6	Chalk & Talk	P.R.L.
January	II	Values of Home –Role of Women in Decision Making –Parental Care-Care of the Aged – Family Conflicts and Resolutions-Gender Justice-Social Justice- Social Integration- Socio Political Awareness- Ideologies of Great Philosophers-Immanuel Kant, Georg Wilhelm Friedrich Hegel and Friedrich Nietzsche	6	Chalk & Talk	S.pranitha
February	III	Character Formation towards Positive Personality – Truthfulness, Sacrifice, Sincerity, Self control, Altruism, Tolerance, Confidence, Honesty and Courage.	6	Chalk & Talk	P.R.L.
March	IV	Karma Yoga in Hinduism –Love and Justice in Christianity –Brotherhood in Islam, Compassion in Buddhism –Ahimsa in Jainism and Courage in Sikhism – Need for Religious Harmony.	6	Chalk & Talk	S.pranitha
April	V	Human rights –Fundamental Rights –Human Rights Act 1993 (Amended 2006)- Consumer Protection Act 1986 – Right to Information Act 2005 –Right to Education Act 2009-Protective Laws for Women –Dowry Prohibition Act 1961 (Amended 1986)And Domestic Violence Act 2005- Constitutional Values- Liberty- Democracy – International Peace.	6	Chalk & Talk	P.R.L. S.pranitha

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LESSON PLAN
2023-2024

Class : I B.Sc Mathematics
Sub. Code : 23OUMAGEPH2
Title of the Paper: Allied Physics – II

Semester : II
Total Hours : 60 Hours

Month	Unit	Description of the Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher Signature
December	I	**OPTICS:** interference – interference in thin films – colors of thin films – air wedge – determination of diameter of a thin wire by air wedge – diffraction – diffraction of light vs sound – normal incidence – experimental determination of wavelength using diffraction grating (no theory) – polarization – polarization by double reflection – Brewster's law – optical activity – application in sugar industries	12	Chalk & Talk	
January	II	**ATOMIC PHYSICS:** atom models – Bohr atom model – mass number – atomic number – nucleons – vector atom model – various quantum numbers – Pauli's exclusion principle – electronic configuration – periodic classification of elements – Bohr magneton – Stark effect –Zeeman effect (elementary ideas only) – photo electric effect – Einstein's photoelectric equation – applications of photoelectric effect: solar cells, solar panels, optoelectric devices	12	Chalk & Talk	
February	III	**NUCLEAR PHYSICS:** nuclear models – liquid drop model – magic numbers – shell model – nuclear energy – mass defect – binding energy – radioactivity – uses – half life – mean life - radio isotopes and uses –controlled and uncontrolled chain reaction – nuclear fission – energy released in fission – chain reaction – critical reaction – critical size- atom bomb – nuclear reactor – breeder reactor – importance of commissioning PFBR in our country – heavy water disposal, safety of reactors: seismic and floods –introduction to DAE, IAEA – nuclear fusion –thermonuclear reactions – differences between fission and fusion.	12	Chalk & Talk	
March	IV	**INTRODUCTION TO RELATIVITY AND GRAVITATIONAL WAVES**: Frame of reference – Postulates of special theory of relativity – Galilean transformation equations – Lorentz transformation equations – Derivation – length contraction – time dilation – twin paradox – mass-energy equivalence –introduction on gravitational waves, LIGO, ICTS opportunities at International Centre for Theoretical Sciences.	12	Chalk & Talk	
April	V	**SEMICONDUCTOR PHYSICS:** p-n junction diode – forward and reverse biasing – characteristic of diode – zener diode – characteristic of zener diode – voltage regulator – full wave bridge rectifier – construction and working – advantages (no mathematical treatment) – USB cell phone charger –introduction to e-vehiclesand EV charging stations	12	Chalk & Talk	

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LESSON PLAN

2023-2024

Class : II B.Sc Chemistry

Sub. Code : 22OUCHGEPH4 **Semester : IV**

Title of the Paper: Thermal physics **Total Hours: 60 Hours**

Month	Unit	Description of the Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher Signature
December	I	**Unit: I Thermal expansion**: Linear expansion of solids-Linear expansivity of crystals-Determination of α by Air Wedge method- Expansion of anisotropic solids–Thermostat- Bimetallic thermostat -Isothermal change-Adiabatic change-Equation for the adiabatic change of a perfect gas-The two specific heat capacities of a gas-Difference between the two specific heat capacities–Joly's differential steam calorimeter for finding C_v-Regnault's method to find C_p.	12	Chalk & Talk	
January	II	**Unit: II Conduction, Convection:**Introduction-Lee's disc method of determining the thermal conductivity of bad conductor-Analogy between heat flow and electric current-Wiedemann -Franz law- Convection –Convection in the atmosphere- Lapse rate- Green house effect- Atmospheric pollution.	12	Chalk & Talk	
February	III	**Unit: III Radiation**: Introduction-Stefan's law – Determination of Stefan's constant by filament heating method –Solar constant –Determination of solar constant by water flow Pyrheliometer-Temperature of the sun - Solar spectrum-Energy distribution in black body spectrum-Statement of Planck's law of radiation-Wien's law - Rayleigh Jean's law.	12	Chalk & Talk	
March	IV	**Unit: IV Kinetic theory of gases:** Postulates of the kinetic theory of gases- Expression for the pressure of a gas-Mean free path-Transport phenomena-Expression for the coefficient of Diffusion and viscosity-Expression for the coefficient of thermal conductivity -Degrees of freedom-Boltzmann's law of equipartition of energy-Atomicity of gases.	12	Chalk & Talk	
April	V	**Unit:V Thermodynamics:** Heat engine-Expression for the efficiency of a Carnot's engine- Carnot's theorem -Second law of thermodynamics-Entropy-Changes of entropy in Carnot's cycle-Change of entropy in conversion of ice into steam -Joule Kelvin effect- Porous Plug experiment–Theory of Porous Plug experiment-Superconductivity.	12	Chalk & Talk	

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LESSON PLAN
2023-2024

Class : II B.Sc Maths
Sub. Code : 22OUMAGEPH4
Title of the Paper: Optics

Semester : IV

Total Hours : 60 Hours

Month	Unit	Description of the Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher Signature
December	I	**Geometrical optics** Convex lens-Principal Focus and Focal Planes-Refraction through a thin lens- Dispersion of Light - Dispersion through a Prism-Cauchy`s Formula- Achromatism in Prisms-Dispersion without Deviation-Direct vision Spectroscope- Spherical aberration in a lens-Chromatic aberration in a lens - Achromatic Combination of Lenses.	12	Chalk & Talk	E. Chris Monica
January	II	**Interference** Introduction-Theory of interference fringes-Fresnel's Biprism- Displacement of fringes - Colours of thin films-Newton's rings-Determination of wavelength of sodium light by Newton's rings –Determination of refractive index of a liquid by Newton's rings-Michelson's interferometer.	12	Chalk & Talk	E. Chris Monica
February	III	**Diffraction** Introduction-Fresnel's explanation of rectilinear propagation of light-Zone plate- Diffraction at a thin wire-Fraunhofer diffraction at a single slit-Fraunhofer diffraction at a double slit-Resolving power of telescope-Resolving power of prism-Resolving power of a plane diffraction grating.	12	Chalk & Talk	K. Shalini
March	IV	**Polarisation** Introduction-Polarisation of Light-Polarisation by reflection-Pile of plates-Law of Malus-Double refraction- Huygen's theory of double refraction in uniaxial crystals-Huygen's construction for double refraction in uniaxial crystals- Nicol prism - Quarter wave plate-Half wave plate.	12	Chalk & Talk	E. Chris Monica
April	V	**Unit: V Laser** The Einstein Coefficients –Relation between Einstein's A and B coefficients- Population Inversion – The Line shape function – Carbon Dioxide Laser – Dye Laser – Nd: YAG Laser – Resonators – Open resonators - The Quality Factor Q -Properties of Laser Beam – Monochromaticity – Directionality.	12	Chalk & Talk	K. Shalini

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LESSON PLAN
2023-2024

Class : III B.Sc Chemistry
Sub. Code : 21AP4
Semester : VI
Title of the Paper: Optics

Total Hours: 60 Hours

Month	Unit	Description of the Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher Signature
December	I	**Geometrical optics** Convex lens-Principal Focus and Focal Planes-Refraction through a thin lens- Dispersion of Light - Dispersion through a Prism-Cauchy's Formula-Achromatism in Prisms-Dispersion without Deviation-Direct vision Spectroscope- Spherical aberration in a lens-Chromatic aberration in a lens	12	Chalk & Talk	E. Chris Monica S. Dhanuja
January	II	**Interference** Introduction-Theory of interference fringes-Fresnel's Biprism- Colours of thin films-Newton's rings-Determination of wavelength of sodium light by Newton's rings –Determination of refractive index of a liquid by Newton's rings-Michelson's interferometer.	12	Chalk & Talk	S. Dhanuja
February	III	**Diffraction** Introduction-Fresnel's explanation of rectilinear propagation of light-Zone plate- Diffraction at a thin wire-Fraunhofer diffraction at a single slit-Fraunhofer diffraction at a double slit-Resolving power of telescope-Resolving power of prism-Resolving power of a plane diffraction grating	12	Chalk & Talk	E. Chris Monica
March	IV	**Polarisation** Introduction-Polarisation of Light-Polarisation by reflection-Pile of plates-Law of Malus-Double refraction-Huygen's theory of double refraction in uniaxial crystals-Huygen's construction for double refraction in uniaxial crystals- Nicol prism - Quarter wave plate-Half wave plate	12	Chalk & Talk	K. Shale
April	V	**Spectroscopy** Introduction- Infrared spectroscopy -Rayleigh's scattering-Raman effect- Discovery - Experimental study of Raman effect-Quantum theory of Raman effect-Applications-Nuclear magnetic resonance.	12	Chalk & Talk	K. Shale

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LESSON PLAN
2023-2024

Class : II M.Sc Physics **Semester : IV**
Sub. Code : 22OPPH41
Title of the Paper: Solid State Physics II **Total Hours : 90 Hours**

Month	Unit	Description of the Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher Signature
December	I	**Superconductivity** Experimental survey– Occurrence and Destruction of Superconductivity - Meissner effect – Heat capacity-energy gap – Micro wave and infrared properties and isotope effect- Theoretical survey- London equation –BCS theory of superconductivity – Type II superconductors-High temperature superconducting (HTC) materials.	18	Chalk & Talk	E.Chris Monica S.Jeyaraj
January	II	**Diamagnetism, Para magnetism** Langevin diamagnetism equation – Quantum theory of diamagnetism of mononuclear systems –Paramagnetism- Quantum theory of paramagnetism – Hund Rules- Spectroscopic splitting factor- Van Vleck temperature-independent paramagnetism - Cooling by isentropic demagnetization- Paramagnetism susceptibility of conduction electrons.	18	Chalk & Talk	E.Chris Monica
February	III	**Ferro and Anti Ferro magnetism** Ferromagnetic order–Curie point and the exchange integral - Magnons- Quantization of spin waves - Neutron magnetic scattering-Ferrimagnetic order- Curie temperature and susceptility - Antiferromagnetic order- Susceptibility below the Neel temperature - Ferromagnetic Domains-Single domain particles.	18	Chalk & Talk	S.Jeyaraj
March	IV	**Plasmons, Polaritons and Polarons** Dielectric function of the electron gas –Plasmons- Electrostatic screening –Polaritons - Electron – Electron interaction - Electron – phonon interaction – Polarons – Peierls instability of linear- Metals. **Optical processes and Excitons:** Optical reflectance - Kramers-Kronig relations - Exciton– Weakly bound excitons - Raman effect in crystals- Electron spectroscopy with X-rays – Energy loss of fast particles in a solid.	18	Chalk & Talk	S.Jeyaraj
April	V	**Point defects** Lattice vacancies – Schottky defects – Frenkel defects – Diffusion - metals – Color centers –F centers –Other centers in alkali halides .**Dislocations:** Shear strength of single crystals – Slip- Dislocations - Burgers vectors- Stress field of dislocations - Low-angle grain boundaries – dislocation densities - Strength of alloys- Dislocation and crystal growth	18	Chalk & Talk	E.Chris Monica

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LESSON PLAN
2023-2024

Class : II M.Sc Physics **Semester : IV**
Sub. Code : 22OPPH42
Title of the Paper: Quantum Mechanics II **Total Hours : 90 Hours**

Month	Unit	Description of the Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher Signature
December	I	**Time independent approximation:** Variation method-Expectation value of the energy-Application to excited states- Ground state of helium-Stationary perturbation theory-Non degenerate case-First order perturbation–second order perturbation–Perturbation of an oscillator-Zeeman effect without electron spin-First order stark effect in hydrogen.	18	Chalk & Talk	
January	II	**Time dependent approximation:** Time-Dependent perturbation theory-First order perturbation-Harmonic perturbation-transition probability-second order perturbation-Adiabatic approximation-Sudden approximation.	18	Chalk & Talk	
February	III	**Identical Particles andspin** Physical meaning of identity-Symmetric and Antisymmetric wave functions-Construction from unsymmetrized functions- The symmetric group-Distinguishability of identical particles-The exclusion principle-Connection with statistical mechanics – Connection between spin and statistics- Spin matrices and eigen functions-Collision of identical particles- Electron spin functions.	18	Chalk & Talk	
March	IV	**Atoms, Molecules and Atomic Nuclei** Central field approximation-Periodic system of elements-Thomas Fermi Statistical Method-Hatree's self consistent field-Molecules-Classification of Energy levels-wave equation-The hydrogen molecule-potential energy function.	18	Chalk & Talk	
April	V	**Relativistic Wave Equations** Schrodinger's Relativistic Equation-Free particle-Electromagnetic potentials-Separation of the equation – Energy levels in a coulomb field-Dirac's relativistic equation-Matrices-Free particle solutions-charge and current densities- Dirac's `equation for a central field-Spin angular momentum - Spin orbit energy-Negative energy states.	18	Chalk & Talk	

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LESSON PLAN
2023-2024

Class : II M.Sc Physics
Sub. Code : 22OPPH43
Title of the Paper: Molecular spectroscopy

Semester : IV

Total Hours : 75 Hours

Month	Unit	Description of the Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher Signature
December	I	**Microwave Spectroscopy** The Rotation of Molecules-Rotational Spectra – The Rigid Diatomic Molecule –The intensities of spectral lines –The effect of Isotopic substitution Polyatomic molecules: linear molecules-symmetric top molecule-Asymmetric top molecules – Techniques and Instrumentation – Chemical Analysis by Microwave Spectroscopy.	15	Chalk & Talk	PRL
January	II	**Infrared Spectroscopy** The vibrating Diatomic molecule – The simple harmonic oscillator-The Anharmonic oscillator-Diatomic vibrating Rotator-The vibration of Polyatomic molecules- Fundamental vibrations and their symmetry-The Influence of Rotation on the spectra of Polyatomic molecules-Linear molecules-Symmetric top molecules-skeletal vibrations-Group frequencies-Techniques and instrumentation –Fourier Transform spectrocopy	15	Chalk & Talk	KSL
February	III	**Raman Spectroscopy** Introduction – Quantum theory of Raman effect-classical theory of Raman effect:Molecular polarizability-Pure Rotational Raman Spectra- Symmetric top molecules-spherical top molecules – Raman activity of vibrations-Rule of mutual Exclusion- overtone and combination vibrations-vibrational raman spectra-Rotational fine structure-Polarization of light and the Raman Effect – Vibrations of spherical top molecules-Structure Determination from Raman and infrared Spectroscopy-Techniques and Instrumentation	15	Chalk & Talk	PRL
March	IV	**Electronic Spectroscopy of Molecules** Electronic Spectra of Diatomic molecules: The Born Oppenheimer Approximation – Vibrational coarse structure: Progressions-Intensity of Vibrational-Electronic Spectra; the Franck Condon Principle-Dissociation Energy and dissociation products – Rotational fine structure of electronic vibration transitions – the Fortrat diagram – Pre dissociation.	15	Chalk & Talk	KSL
April	V	**Spin resonance Spectroscopy** Spin and an applied field – Interaction between spin and a magnetic field-population of energy levels-The larmor procession-Relaxation times-Fourier transform spectroscopy in NMR-Nuclear magnetic resonance spectroscopy :Hydrogen nuclei-The chemical shift-The coupling constant-coupling between several nuclei-chemical analysis by N.M.R.Techniques-Exchange phenomena.	15	Chalk & Talk	PRL

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LESSON PLAN
2023-2024

Class : II M.Sc Physics
Sub. Code : 22OPPHDSE4A
Title of the Paper: Microprocessor

Semester : IV

Total Hours : 75 Hours

Month	Unit	Description of the Syllabus	Hours Allocated	Teaching Mode & Methods	Course Teacher Signature
December	I	**The 8085 Programming model** 8085 Hardware Model – 8085 programming model - Instruction Classification – the 8085 Instruction Set - Instruction, Data format and Storage – Instruction word size – Opcode Format – Data Format - How to write, Assembly, and Executive a simple program - Micro processor architecture and its operations – Memory Classification.	15	Chalk & Talk	
January	II	**Basic Operations** Data Transfer operations – Addressing modes –Data Transfer from register to output –Data transfer to control output devices - Arithmetic Operations –Addition – Addition and Increment – Subtraction – Subtraction of two unsigned numbers - Logic Operations –Logic AND –Data Masking with Logic AND – OR, Exclusive-OR and NOT- ORing Data from two Input Ports – Branch Operations-unconditional jump – conditional jumps – Writing Assembly Language Programs – debugging a program.	15	Chalk & Talk	
February	III	**Counters and time delays** Time delay using One Register - Time delay using a Register pair – time delay using a loop with in a loop Technique – Counter design with time delay – Illustrative programs – Hexa decimal counters – 0 to 9 Counter – Generative pulse wave form – Debugging: Counters and Time delay program - Stack – Subroutines.	15	Chalk & Talk	
March	IV	**Binary conversion and 8085 Interrupts** BCD to Binary conversion –Binary to BCD conversion - BCD to seven segment – Binary-to-ASCII and ASCII –to –binary code conversion –BCD addition – BCD subtraction - Multiplication – Subtraction with carry- The 8085 interrupts-RST(Reset) Instruction-Multiple Interrupts and Priorities.	15	Chalk & Talk	
April	V	**8051 Microcontroller** Introduction - MCS -51 Architecture – Register in MCS-51-8051 pin description – 8051 Connections – 8051 Parallel I/O ports – Memory Organization – 8051 Addressing modes – MCS-51 Instruction set – 8051 Instructions and Simple Programs – Using Stack Pointers.	15	Chalk & Talk	

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