ANNUAL CURRICULAR PLAN I/III/V

YEAR: **2022-2023**

SEMESTER & PAPER: **I BSC SEMESTER – I (New Syllabus) –PAPER-I** MECHANICS**, WAVES & OSCILLATIONS**

NAME OF THE LECTURER: **P RAMAKRISHNA RAO & P Rajeswari**

Month & Week	Hours available	Syllabus Topic	Additional Inputs / Value Additions	Curricular Activity				Co-Curricular Activity			
				Activity	Hours Allotted	Whether Conducted	If not Alternate Date	Activity	Hours Allotted	Whether Conducted	If not Alternate Date
October, 2022	12	**Mechanics of Particles:** Review of Newton's Laws of Motion, Motion of variable mass system, Motion of a rocket, Multistage rocket, Concept of impact parameter, scattering cross-section, Rutherford scattering-Derivation. **Mechanics of Rigid bodies:** Rigid body, rotational kinematic relations, Equation of motion for a rotating body, Angular momentum and Moment of inertia tensor, Euler equations, Precession of a spinning top, Gyroscope, Precession of atom and nucleus in magnetic field, Precession of the equinoxes.	**Precession of atom and nucleus in magnetic field**	Mechanics of Particles Mechanics of Rigid bodies	6 6	Yes Yes		PPT Assignment PPT	1 1 1	Yes Yes Yes	
November,	16	**Motion in a Central Force Field:**									

2022		Central forces, definition and examples, characteristics of central forces, conservative nature of central forces, Equation of motion under a central force, Kepler's laws of planetary motion- Proofs, Motion of satellites. **Relativistic Mechanics:** Introduction to relativity, Frames of reference, Galilean transformations, absolute frames, Michelson-Morley experiment, negative result, Postulates of Special theory of relativity, Lorentz transformation, time dilation, length contraction, variation of mass with velocity, Einstein's mass-energy relation	**Motion of satellites**. **variation of mass with velocity**	Motion in a Central Force Field Relativistic Mechanics	8 8	Yes Yes		PPT Assignment PPT Student seminars	1 1 1 1	Yes Yes Yes Yes	
December, 2022	16	**Undamped, Damped and Forced oscillations:** Simple harmonic oscillator and solution of the differential equation, Damped harmonic oscillator, Forced harmonic oscillator – Their differential equations and solutions, Resonance, Logarithmic decrement, Relaxation time and Quality factor. **Complex vibrations:** Fourier theorem and evaluation of the Fourier coefficients, analysis of periodic wave functions-square wave.		Undamped, Damped and Forced oscillations Complex vibrations	8 8	Yes Yes		Assignment Assignment	1 1	YES YES	
January, 2023	08	**Vibrating Strings:** Transverse wave propagation along a stretched string, General solution of wave equation and its significance, Modes of vibration of stretched string clamped at ends, Overtones and		Vibrating Strings	8	Yes		Assignment	1	Yes	

		Harmonics, Melde’s strings. **Ultrasonics:** Ultrasonics, General Properties of ultrasonic waves, Production of ultrasonics by piezoelectric and magnetostriction methods, Detection of ultrasonics, Applications of ultrasonic waves, SONAR		Ultrasonics	8	Yes		Student seminar	1	Yes	

ANNUAL CURRICULAR PLAN II/IV/VI

YEAR: **2022-2023**
SEMESTER & PAPER: **II BSC SEMESTER - II (New Syllabus) - PAPER: II Title: WAVE OPTICS**
NAME OF THE LECTURER: **V SANDYA & P Rajeswari**

Month & Week	Hours available	Syllabus Topic	Additional Inputs / Value Additions	Curricular Activity				Co-Curricular Activity			
				Activity	Hours Allotted	Whether Conducted	If not Alternate Date	Activity	Hours Alloted	Whether Conducted	If not Alternate Date
February, 2023	16	**Interference of light:** Introduction, Conditions for interference of light, Interference of light by division of wave front and amplitude, Interference in thin films: Plane parallel and wedge-shaped films, colours in thin films, Newton's rings in reflected light-Theory and experiment, Determination of wavelength of monochromatic light, Michelson interferometer and determination of wavelength.		**Interference of light**	16	Yes		Assignment PPT	1 1	Yes YES	
March, 2023	16	**Diffraction of light:** Introduction, Types of diffraction: Fresnel and Fraunhoffer diffractions, Distinction between Fresnel and Fraunhoffer diffraction, Fraunhoffer diffraction at a single slit. Determination of wavelength of light using diffraction grating, Resolving power of grating, Fresnel's half period zones, Zone plate, comparison of zone		**Diffraction of light:**	06	Yes		PPT Assignment	1 1	Yes Yes	

		plate with convex lens.									
April, 2023	16	**Polarisation of light:** Polarized light: Methods of production of plane polarized light, Double refraction, Brewster's law, Malus law, Nicol prism, Nicol prism as polarizer and analyzer, Quarter wave plate, Half wave plate, Plane, Circularly and Elliptically polarized light-Production and detection, Optical activity, Laurent's half shade polarimeter: determination of specific rotation. **Aberrations**: Monochromatic aberrations, Spherical aberration, Methods of minimizing spherical aberration, Coma, Astigmatism and Curvature of field, Distortion; Chromatic aberration-the achromatic doublet; Achromatism for two lenses (i) in contact and (ii) separated by a distance.		**Polarisation of light:** **Aberrations**:	12 06	Yes Yes		Assignment Assignment IV Student seminar	1 1 1	Yes YES Yes	
May	08	**Fibre optics:** Introduction to Fibers, different types of fibers, rays and modes in an optical fiber, Principles of fiber communication (qualitative treatment only), Advantages of fiber optic communication. **Lasers and Holography:** **Lasers:** Introduction, Spontaneous emission, stimulated emission, Population Inversion, Laser principle, Einstein coefficients, Types of lasers-He-Ne laser, Ruby laser, Applications of lasers; **Holography:** Basic principle of holography, Applications of holography.		**Fibre optics:** **Lasers and Holography:**	06 06	Yes Yes		Student seminar I Assignment	1 1	Yes YES	

ANNUAL CURRICULAR PLAN II/IV/VI

YEAR: **2022-2023**

SEMESTER & PAPER**: II BSC SEMESTER- III PAPER-III HEAT & THERMODYNAMICS**

NAME OF THE LECTURER: Dr A P V APPA RAO, Dr L MALLESWARA RAO, Sri CH SUNDAR SINGH, G SUVARCHALA DEVI & A RAJESH

Month & Week	Hours available	Syllabus Topic	Additional Inputs / Value Additions	Curricular Activity				Co-Curricular Activity			
				Activity	Hours Allotted	Whether Conducted	If not Alternate Date	Activity	Hours Allotted	Whether Conducted	If not Alternate Date
October, 2022	12	**Kinetic theory of gases:** Introduction – Deduction of Maxwell's law of distribution of molecular speeds, Transport Phenomena – Viscosity of gases – thermal conductivity – diffusion of gases. **Thermodynamics :** Introduction – Reversible and irreversible processes – Carnot's engine and its efficiency – Carnot's theorem – Second law of thermodynamics, Kelvin's and Claussius statements – Thermodynamic scale of temperature.	**Degrees of freedom** **Thermodynamic scale of temperature and its identity with perfect gas scale**	Transport Phenomena Carnot's engine and it's efficiency	01 01	YES YES		Assignment I	1	YES	
November, 2022	16	**Entropy**:- Entropy, physical significance –	.								

		Change in entropy in reversible and irreversible processes – Entropy and disorder – Entropy of universe – Temperature- Entropy (T-S) diagram. Change of Entropy of a perfect gas – Change of entropy when ice changes into steam. **Thermodynamic potentials and Maxwell's equations:** Thermodynamic potentials – Derivation of Maxwell's thermodynamic relations – Clausius-Clayperon's equation – Derivation for ratio of specific heats – Derivation for difference of two specific heats for perfect gas. Joule Kelvin effect – expression for Joule Kelvin coefficient for perfect and Vanderwaal's gas.		Change of Entropy of a perfect gas Clausius-Clayperon's equation	07 08	YES YES		Assignment II Seminar Assignment III Seminar	1 hour 1 1 Hour 1 Hour	YES YES YES YES	
December, 2022	16	**Low temperature Physics:** Introduction – Joule Kelvin effect – liquefaction of gas using porous plug experiment. Joule expansion – Distinction between adiabatic and Joule Thomson expansion – Expression for Joule Thomson cooling – Liquefaction of helium, Kapitza's method – Adiabatic demagnetization – Production of low temperatures – Principle of refrigeration, vapour compression		Adiabatic demagnetization Production of low temperatures	15	YES		Assignment IV	1 hour	YES	

		type. Working of refrigerator and Air conditioning machines. Effects of Chloro and Fluro Carbons on Ozone layer.									
January, 2023	08	**Quantum theory of radiation:** Black body-Ferry's black body – distribution of energy in the spectrum of Black body – Wein's displacement law, Wein's law, Rayleigh-Jean's law – Quantum theory of radiation - Planck's law – deduction of Wein's law and Rayleigh-Jeans law from Planck's law - Measurement of radiation – Earth as a Black Body. Types of pyrometers – Disappearing filament optical pyrometer – experimental determination – determination of solar constant, effective temperature of sun.		Disappearing filament optical pyrometer – experimental determination	15	Yes		Assignment V	1 hour	YES	

ANNUAL CURRICULAR PLAN I/III/V

YEAR: **2022-2023**

SEMESTER & PAPER: **II BSC SEMESTER-IV PAPER-IV Title: ELECTRICITY, MAGNETISM AND ELECTRONICS**

NAME OF THE LECTURER: **P Ramakrishna Rao, Ch Sundar Singh, V Durga Sandhya & M S Ranganayakulu**

Month & Week	Hours available	Syllabus Topic	Additional Inputs / Value Additions	Curricular Activity				Co-Curricular Activity			
				Activity	Hours Allotted	Whether Conducted	If not Alternate Date	Activity	Hours Allotted	Whether Conducted	If not Alternate Date
February, 2023	12	**Electrostatics: (6hrs)** Gauss's law-Statement and its proof, Electric field intensity due to (i) uniformly charged solid sphere and (ii) an infinite conducting sheet of charge, Deduction of Coulomb's law from Gauss law, Electrical potential–Equipotential surfaces, Potential due to a (i) dipole (ii)uniformly charged sphere **2. Dielectrics:** Dielectrics-Polar and Non-polar dielectrics-Effect of electric field on dielectrics, Dielectric strength, Capacitance of a parallel plate condenser with dielectric slab between the plates, Electric displacement D, electric polarization P, Relation between D, E and P, Dielectric constant and electric		Electrostatics Dielectrics	8 6	YES YES		Assignment I Assignment II	1 1	YES yes	

		susceptibility.									
March, 2023	12	**3. Magnetostatics:** Biot-Savart's law and its applications: (i) circular loop and (ii) solenoid, **Divergence and curl of magnetic field,** Ampere's Circuital Law and its application to Solenoid, Hall effect, determination of Hall coefficient and applications. **4. Electromagnetic Induction:** Faraday's laws of electromagnetic induction, Lenz's law, Self induction and Mutual induction, Self inductance of a long solenoid, Mutual inductance of two coils, Energy stored in magnetic field, Eddy currents and Electromagnetic damping. **5. Alternating currents:** Alternating current - Relation between current and voltage in LR and CR circuits, Phasor and Vector diagrams, LCR series and parallel resonant circuit, Q –factor, Power in ac circuits, Power factor.	**Divergence and curl of magnetic field,**	Magnetostatics Moving charges in electric and magnetic fields Electromagnetic Induction	10 8 4	YES YES YES		Assignment-III Seminar Assignment IV	01 Hour 02 Hours 01 Hour	YES YES YES	
April, 2023	12	**6. Electromagnetic waves-Maxwell's equations:** Idea of displacement current, Maxwell's equations-Derivation, Maxwell's wave equation (with derivation), Transverse nature of electromagnetic waves, Poynting theorem (Statement only**).** **Basic Electronic devices:** PN junction diode, Zener diode and Light Emitting Diode (LED) and their I-V characteristics, Zener diode as a regulator-	**Hybrid parameters, Determination**								

		Transistors and its operation, CB, CE and CC configurations, Input and output characteristics of a transistor in CE mode, Relation between alpha, beta and gamma; **Hybrid parameters, Determination of hybrid parameters from transistor characteristics;** Transistor as an amplifier.	**of hybrid parameters from transistor characteristics**								
May, 2023	12	**Digital Electronics: (12 hrs)** Number systems, Conversion of binary to decimal system and vice versa, Binary addition & Binary subtraction (1's and 2's complement methods), Laws of Boolean algebra, DeMorgan's laws-Statements and Proofs, Basic logic gates, NAND and NOR as universal gates, Exclusive-OR gate, Half adder and Full adder circuits.		Digital electronics	6	YES		Assignment V	1	YES	

ANNUAL CURRICULAR PLAN II/IV/VI

YEAR: 2022-2023

SEMESTER & PAPER: **II BSC SEMESTER - IV PAPER- V Title: MODERN PHYSICS**

NAME OF THE LECTURER: **DR APV APPARAO**, **DR L MALLESWARA RAO, P Rajeswari & G Suvarchala Devi**

Month & Week	Hours available	Syllabus Topic	Additional Inputs / Value Additions	Curricular Activity				Co-Curricular Activity			
				Activity	Hours Allotted	Whether Conducted	If not Alternate Date	Activity	Hours Allotted	Whether Conducted	If not Alternate Date
February, 2023	12	**Atomic and Molecular Physics :** Vector atom model and Stern-Gerlach experiment, Quantum numbers associated with it, Angular momentum of the atom, Coupling schemes, **Spectral terms and spectral notations**, **Selection rules, Intensity rules**, Fine structure of Sodium D-lines, Zeeman effect, Experimental arrangement to study Zeeman effect; Raman effect, Characteristics of Raman effect, Experimental arrangement to study Raman effect, Quantum theory of Raman effect, Applications of Raman effect	**Spectral terms and spectral notations**, **Selection rules, Intensity rules**		09	Yes		Assignment I	1	Yes	
March, 2023	12	**2. Matter waves & Uncertainty Principle:** Matter waves, de Broglie's hypothesis, Wave length of matter waves, Properties of matter waves, Davisson and Germer's experiment, Phase and group velocities (Qualitative treatment), Heisenberg's uncertainty principle for position and momentum& energy and time, Illustration of uncertainty principle using diffraction of beam of electrons (Diffraction by a single slit) and	**Bohr's principle of complementarity.**		09	Yes		Student seminar I Assignment II	1	Yes	

		photons (Gamma ray microscope), **Bohr's principle of complementarity.** **UNIT-III:** **3. Quantum (Wave) Mechanics :** Basic postulates of quantum mechanics, Schrodinger time independent and time dependent wave equations-Derivations, Physical interpretation of wave function, Eigen functions, Eigen values, Application of Schrodinger wave equation to (i) one dimensional potential box of infinite height (Infinite Potential Well) **and (ii) one dimensional harmonic oscillator**	**one dimensional harmonic oscillator**		09	Yes		Assignment III	1	YES	
April, 2023	12	**4. Nuclear Physics : (12 hrs)** ***Nuclear Structure*:** General Properties of Nuclei, Mass defect, Binding energy; *Nuclear forces*: **Characteristics of nuclear forces- Yukawa's meson theory;** *Nuclear Models*: Liquid drop model, The Shell model, Magic numbers; *Nuclear Radiation detectors*: G.M. Counter, Cloud chamber, Solid State detector; *Elementary Particles*: Elementary Particles and their classification. **UNIT-V:** **5. Nano materials :(7hrs)** Nanomaterials – Introduction, Electron confinement, Size effect, Surface to volume ratio, Classification of nano materials– (0D, 1D, 2D); Quantum dots, Nano wires, Fullerene, CNT, Graphene (Mention of structures and properties), Distinct properties of nano materials (Mention-*mechanical, optical, electrical, and magnetic*	**Characteristics of nuclear forces- Yukawa's meson theory**		09	Yes Yes		PPT Assignment IV Career Guidance Class	1 1 1	Yes YES Yes	

		properties); Mention of applications of nano materials: (*Fuel cells, Phosphors for HD TV, Next Generation Computer chips, elimination of pollutants, sensors*)									
May, 2023	06	**6. Superconductivity: (5 hrs)** Introduction to Superconductivity, Experimental results-critical temperature, critical magnetic field, Meissner effect , Isotope effect, Type I and Type II superconductors, **BCS theory (elementary ideas only),** Applications of superconductors.	**BCS theory (elementary ideas only),**		09	Yes		PPT seminar Career Guidance Class Assignment V	1 1 1 1	Yes Yes Yes Yes	

ANNUAL CURRICULAR PLAN

YEAR: **2022-2023**
SEMESTER & PAPER: **III BSC SEMESTER – V PAPER-VI Title: LOW TEMPERATURE PHYSICS & REFRIGERATION**
NAME OF THE LECTURER**: Ch Sundar Singh, M S Ranganayakulu, K Naveen Kumar, V Durga Sandhya & A Rajesh**

Month & Week	Hours available	Syllabus Topic	Additional Inputs / Value Additions	Curricular Activity				Co-Curricular Activity			
				Activity	Hours Allotted	Whether Conducted	If not Alternate Date	Activity	Hours Allotted	Whether Conducted	If not Alternate Date
October, 2022	09	**UNIT-I PRODUCTION OF LOW TEMPERATURE** Production of low temperatures-Introduction, Joule-Thomson effect, Regenerative cooling, Different methods of liquefaction of gases, liquefaction of air-Claude's method, Production of liquid hydrogen and **Helium-Kapitza's method**, Adiabatic demagnetization, Properties of materials at low temperatures, Superconductivity **(qualitative treatment only).** **UNIT-II MEASUREMENT OF LOW TEMPERATURE** Gas thermometer and its correction and calibration, Secondary thermometers, resistance thermometers, thermocouples, Vapour pressure thermometers, Magnetic thermometers, Advantages and drawbacks of each type of thermometer.	**Helium-Kapitza's method**	Joule-Thomson effect, Regenerative cooling, Different methods of liquefaction of gases.	01	YES		Assignment	1	YES	
November, 2022	12	**UNIT-III PRINCIPLES OF REFRIGERATION** Introduction to Refrigeration- Natural and	**applications of Refrigeration**	Types of refrigeration -	01	YES		Assignment	1	YES	

		artificial refrigeration , Stages of refrigeration, Types of refrigeration -Vapor compression and vapor absorption refrigeration systems, Refrigeration cycle and explanation with a block diagram, **applications of Refrigeration** Introductory ideas on air-conditioning **(qualitative treatment only).** Refrigerants-Introduction, Ideal refrigerant, Properties of refrigerant, **Requirement of refrigerants**, **Selection of refrigerants,** Classification of refrigerants, commonly used refrigerants, Eco-friendly refrigerants.	**Requirement of refrigerants**, **Selection of refrigerants**	Vapor compression and vapor absorption refrigeration systems,							
December, 2022	12	**UNIT-IV COMPONENTS OF REFIGERATOR** Refrigerator and its working, Block diagram, Coefficient of Performance (COP), Tons of refrigeration (TR) and Energy Efficiency Ratio (EER), ***Refrigerator components:*** Types of compressors, evaporators and condensers, **differences between Heat engine and refrigerator,** Refrigerant leakage and detection.	**differences between Heat engine and refrigerator,**	Refrigerator and its working, Block diagram, Coefficient of Performance (COP), Tons of refrigeration (TR) and Energy	01	YES		Assignment	01	YES	
January, 2023	06	**UNIT-V APPLICATIONS OF LOW TEMPERATURE & REFRIGERATION** Applications of Low temperatures: Preservation of biological material, Food freezing, liquid nitrogen and liquid hydrogen in medical field, Superconducting magnets in MRI. Applications of refrigeration: Domestic refrigerators, Water coolers, Cold storages, Ice plants, Food preservation methods, Chemical and Process industries, Cold treatment of metals.		Preservation of biological material, Food freezing,	01	YES		Seminar Assignment	01 01	YES YES	

ANNUAL CURRICULAR PLAN

YEAR: 2021-2022

SEMESTER & PAPER: III BSC SEMESTER – V PAPER-VII Title: SOLAR ENERGY AND APPLICATIONS

NAME OF THE LECTURER: Dr L Malleswara Rao, P Rama Krishna Rao, P Rajeswari, G Suvarchala Devi, & K Naveen Kumar

Month & Week	Hours available	Syllabus Topic	Additional Inputs / Value Additions	Curricular Activity				Co-Curricular Activity			
				Activity	Hours Allotted	Whether Conducted	If not Alternate Date	Activity	Hours Allotted	Whether Conducted	If not Alternate Date
October, 2022	9	**Unit - I: BASIC CONCEPTS OF SOLAR ENERGY** (10hrs) Spectral distribution of solar radiation, Solar constant , zenith angle and Air-Mass, standard time, local apparent time, equation of time, direct, diffuse and total radiations. **Prediction of available solar radiation, Solar energy- Importance and global warming**, **Storage of solar energy, Solar pond.** Pyrheliometer - working principle, direct radiation measurement, Pyrometer-working Principle, diffuse radiation measurement, Distinction between the two meters.	**Prediction of available solar radiation, Solar energy- Importance and global warming**, **Storage of solar energy, Solar pond.**	Pyrheliometer - working principle, direct radiation measurement,	9	Yes		Assignment I Student seminar I	1 1	Yes Yes	
November, 2022	12	**Unit - II: SOLAR THERMAL COLLECTORS** (10hrs) **Solar Thermal Collectors**-Introduction, Types of Thermal collectors, Flat plate collector – liquid heating type, Energy balance equation and efficiency, **Solar Thermal Power Plant** Evacuated tube collector, Definitions of collector efficiency, Testing of flat-plate	**Solar Thermal Power Plant**	Types of Thermal collectors, Flat plate collector – liquid heating type, Energy balance	12	Yes Yes		Assignment II PPT I Assignment III Career Guidance	1 1 1 1	Yes Yes Yes Yes	

		collector, solar water heating system, natural and forced circulation types. Concentrating collectors, Solar cookers, Solar dryers, Solar desalinators. **Solar green houses.** **FUNDAMENTALS OF SOLAR CELLS** Semiconductor interface, Types, homo junction, hetero junction and Schottky barrier, advantages and drawbacks, Photovoltaic Effect, Photovoltaic cell, equivalent circuit, output parameters, conversion efficiency, **Photovoltaic applications**, **Solar photovoltaic cell and its working principle,** Measurement of I-V characteristics, series and shunt resistance of a solar cell, their effect on efficiency.	**Photovoltaic applications**, **Solar photovoltaic cell and its working principle**	equation and efficiency,				Class			
December, 2022	12	**TYPES OF SOLARCELLS AND MODULES** Types of solar cells, Crystalline silicon solar cells, poly-Si cells, Thin film solar cells-CdTe/CdS and CuInGaSe2/CdS cell configurations, structures, advantages and limitations, Multi junction cells – Double and triple junction cells. Module fabrication steps, Modules in series and parallel, Bypass and blocking diodes. **Solar PV system and its components.**	**Solar PV system and its components.**	Modules in series and parallel, Bypass and blocking diodes.	12	Yes Yes		Assignment IV PPT II Student seminar II	1 1 1	Yes Yes Yes	
January, 2023	06	**SOLAR PHOTOVOLTAIC SYSTEMS** Energy storage in PV systems: Need of energy storage, Energy storage modes, electrochemical storage, Batteries: Primary and secondary, Solid-state battery, Molten solvent battery, lead acid battery and dry batteries-**Nickel Cadmium Batteries,** Electrical storage – **Differences between Capacitor and Battery**, Super capacitor. **Role of carbon Nano-tubes in electrodes.**	**Nickel Cadmium Batteries, Role of carbon Nano-tubes in electrodes.**	Batteries: Solid-state battery, Molten solvent battery, lead acid battery and dry batteries	06	Yes		Assignment V Career Guidance Class	1 1	Yes Yes	