ANNUAL CURRICULAR PLAN I/III/V

YEAR: **2023-2024**

SEMESTER & PAPER: **I BSC SEMESTER – I (New Syllabus w.e.f 2023-2024)–Course-I ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES**

NAME OF THE LECTURER: **P Ramakrishna Rao, Ch Sundar Singh, MS Ranganayakulu & VD Sandhya**

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
August, 2023	02	**UNIT II: ESSENTIALS OF PHYSICS:** Definition and Scope of Physics- Measurements and Units - Motion of objects: Newtonian Mechanics and relativistic mechanics perspective.	**Motion of Objects**	Mechanics of Particles	6	Yes		PPT Assignment	1 1	Yes Yes	
September, 2023	08	**UNIT II: ESSENTIALS OF PHYSICS:** Laws of Thermodynamics and Significance- Acoustic waves and electromagnetic waves- Electric and Magnetic fields and their interactions-Behaviour of atomic and nuclear particles- Wave-particle duality, the uncertainty principle- Theories and understanding of universe.	**Atomic and nuclear particles**.	Wave-particle duality, the uncertainty	8	Yes		PPT Assignment	1 1	Yes Yes	

October, 2023	08	**UNIT IV: APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY:** **Application of Physics in Industry and Technology**: Electronics and Semiconductor Industry, Robotics and Automation.			8	Yes		Assignment	1	YES	
November 2023	08	**UNIT IV: APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY:** Automotive and Aerospace Industries, Quality Control and Instrumentation, Environmental Monitoring and Sustainable Technologies.	Environmental Monitoring and Sustainable Technologies.	Quality Control and Instrumentation	8	Yes		Assignment	1	Yes	

ANNUAL CURRICULAR PLAN II/III/V

YEAR: **2023-2024**

SEMESTER & PAPER**: I BSC SEMESTER- I PAPER-Course-II ADVANCES OF MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES**

NAME OF THE LECTURER: Dr L Malleswara Rao, V Durga Sandhya & 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
August, 2023	02	**UNIT II: ADVANCES IN PHYSICS:** **Renewable energy**: Generation, energy storage, and energy-efficient materials and devices.	**Renewable Energy**	Solar energy, wind energy etc	01	YES		Assignment I	1	YES	
September 2023	08	**UNIT II: ADVANCES IN PHYSICS:** **Renewable energy**: Generation, energy storage, and energy-efficient materials and devices. **Recent advances in the field of nanotechnology**: Quantum dots, Quantum Communication- recent advances in biophysics- recent advances in medical physics-Shape Memory Materials.	Quantum dots	biophysics	07	YES		Assignment II Seminar Assignment III	1 hour 1 1 Hour	YES YES YES	

October 2023	08	**UNIT IV: ADVANCED APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY :** Renewable energy: Grid Integration and Smart Grids, Application of nanotechnology: Nanomedicine, Application of biophysics: Biophysical Imaging.	Application of nanotechnology	Application of nanotechnology:	15	YES		Assignment IV	1 hour	YES	
November 2023	08	**UNIT IV: ADVANCED APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY** Biomechanics, Neurophysics, Application of medical physics: Radiation Therapy, Nuclear medicine Solid waste management, Environmental remediation- Green Technology, Water treatment.	Solid waste management	Water treatment	15	Yes		Assignment V	1 hour	YES	

ANNUAL CURRICULAR PLAN I/III/V

YEAR: **2023-2024**

SEMESTER & PAPER**: I BSC SEMESTER- I PAPER- MULTIDISCIPLINARY COURSE (MDC) PRINCIPLES OF PHYSICAL SCIENCES**

NAME OF THE LECTURER: Dr L Malleswara Rao, V Durga Sandhya & 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
August 2023	04	**UNIT 1: INTRODUCTION TO PHYSICS** Nature of Physics: Overview of physics as a discipline, its scope, and its relationship to other sciences. Scientific Method in Physics: Introduction to the scientific method and its application in the study of physics. Measurement and Units: Understanding the principles of measurement, SI units, and the importance of accurate and precise measurements. Scalars and Vectors: Differentiating between scalars and vectors, understanding vector addition and subtraction.	Understanding the principles of measurement, SI units, and the importance of accurate and precise measurements.	Understanding vector addition and subtraction.	01	YES		Assignment I	1	YES	
September, 2023	08	**UNIT 2: MECHANICS FOR ARTS STUDENTS** Motion and Forces: Introduction to the principles of motion, including velocity, acceleration, and the laws of motion. Energy	Different forms of energy, and the relationship between work and energy.	Gravity: Introduction to theconcept of gravity, Newton's law of universal gravitation, and its implications.	08	YES		Assignment II Seminar Assignment III	1 hour 1 1 Hour	YES YES	

		and Work: Understanding the concept of energy, different forms of energy, and the relationship between work and energy. Circular Motion: Exploring the principles of circular motion, centripetal force, and applications in real-world scenarios. Gravity: Introduction to the concept of gravity, Newton's law of universal gravitation, and its implications.								YES	
October 2023	08	**UNIT 3: WAVES AND OPTICS FOR ARTS STUDENTS** Waves: Understanding the properties and characteristics of waves, including wave types, wave motion, and wave interference. Sound Waves: Exploring the nature of sound waves, including properties of sound, sound propagation, and the Doppler Effect.	characteristics of waves, including wave types,	Doppler Effect	08	YES		Assignment IV	1 hour	YES	
November 2023	08	Light and Optics: Introduction to the behavior of light, reflection, refraction, and the formation of images by mirrors and lenses. Wave Optics: Understanding the principles of interference, diffraction, and polarization of light waves.	Understanding the principles of interference	diffraction, and polarization of light waves	15	Yes		Assignment V	1 hour	YES	

ANNUAL CURRICULAR PLAN I/III/V

YEAR: **2023-2024**

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

NAME OF THE LECTURER: Dr A P V APPA RAO

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
August 2023	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	
September, 2023	16	**Entropy**:- Entropy, physical significance – Change in entropy in reversible and irreversible processes –	.	Change of Entropy of a	07	YES		Assignment II	1 hour	YES	

		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.		perfect gas Clausius-Clayperon's equation	08	YES		Seminar Assignment III Seminar	1 1 Hour 1 Hour	YES YES YES	
October 2023	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 type. Working of refrigerator and		Adiabatic demagnetization Production of low temperatures	15	YES		Assignment IV	1 hour	YES	

		Air conditioning machines. Effects of Chloro and Fluro Carbons on Ozone layer.									
November, 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	

December, 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 II/IV/VI

YEAR: **2023-2024**

SEMESTER & PAPER: **I BSC SEMESTER – II (New Syllabus w.e.f 2023-2024)– COURSE 3: MECHANICS AND PROPERTIES OF MATTER**

NAME OF THE LECTURER: **P Ramakrishna Rao, Ch Sundar Singh, MS Ranganayakulu & VD Sandhya**

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
December 2023	12	UNIT-I VECTOR ANALYSIS Scalar and vector fields, gradient of a scalar field and its physical significance. Divergence and curl of a vector field with derivations and physical interpretation. Vector integration (line, surface and volume), Statement and proof of Gauss and Stokes theorems.	**Precession of atom and nucleus in magnetic field**	Mechanics of Particles	6	Yes		PPT Assignment	1 1	Yes Yes	
January 2024	16	UNIT-II MECHANICS OF PARTICLES Laws of motion, motion of variable mass system, Equation of motion of a rocket. Conservation of energy and momentum, Collisions in two and three dimensions, Concept of impact parameter, scattering cross-section, Rutherford scattering-derivation.	**Motion of satellites**.		8	Yes		PPT Assignment	1 1	Yes Yes	

		UNIT-III MECHANICS OF RIGID BODIES AND CONTINUOUS MEDIA 9hrs Definition of rigid body, rotational kinematic relations, equation of motion for a rotating body, Precession of a top, Gyroscope, Precession of the equinoxes. Elastic constants of isotropic solids and their relations, Poisson's ratio and expression for Poisson's ratio. Classification of beams, types of bending, point load, distributed load.	Precession of a top, Gyroscope, Precession of the equinoxes.		8	Yes		PPT Student seminars	1 1	Yes Yes	
February, 2024	16	**UNIT-IV CENTRAL FORCES** Central forces, definition and examples, characteristics of central forces, conservative nature of central forces, conservative force as a negative gradient of potential energy, equations of motion under a . Derivation of Kepler's laws. Motion of satellites		Motion in a Central Force Field	8	Yes		Assignment	1	YES	
March, 2024	08	**UNIT-V SPECIAL THEORY OF RELATIVITY** Galilean relativity, Absolute frames. Michelson-Morley experiment, the negative result. Postulates of special theory of relativity. Lorentz transformation, time dilation, length contraction, addition of velocities, mass-energy relation.	Absolute frames.	Lorentz transformation, time dilation	8	Yes		Assignment	1	Yes	

ANNUAL CURRICULAR PLAN II/IV/VI

YEAR: **2023-2024**

SEMESTER & PAPER**: I BSC SEMESTER- II PAPER- COURSE 4: WAVES AND OSCILLATIONS**

NAME OF THE LECTURER: Dr L Malleswara Rao, V Durga Sandhya & 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
December, 2023	12	**UNIT-I SIMPLE HARMONIC OSCILLATIONS** Simple harmonic oscillator and solution of the differential equation-Physical characteristics of SHM, torsion pendulum-measurements of rigidity modulus, compound pendulum-measurement of 'g', Principle of superposition, beats, combination of two mutually perpendicular simple harmonic vibrations of same frequency and different frequencies. Lissajous figures.	Physical characteristics of SHM,	compound pendulum-measurement of 'g',	01 01	YES YES		Assignment I	1	YES	
January, 2024	16	**UNIT-II DAMPED AND FORCED OSCILLATIONS** Damped harmonic oscillator, solution of the differential equation of damped oscillator. Energy considerations, comparison with un-damped harmonic oscillator,	Damped harmonic oscillator, solution of the differential equation of damped oscillator	differential equation of forced oscillator	07	YES		Assignment II Seminar Assignment III	1 hour 1	YES YES	

		logarithmic decrement, relaxation time, quality factor, differential equation of forced oscillator and its solution, amplitude resonance and velocity resonance. **UNIT-III COMPLEX VIBRATIONS** Fourier theorem and evaluation of the Fourier coefficients, analysis of periodic wave functions-square wave, triangular wave, saw tooth wave, simple problems on evolution of Fourier coefficients.	triangular wave	evaluation of Fourier coefficients	08	YES		Seminar	1 Hour 1 Hour	YES YES	
February 2024	16	**UNIT-IV VIBRATING STRINGS AND BARS** 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 harmonics. Energy transport and transverse impedance. Longitudinal vibrations in bars-wave equation and its general solution. Special cases (i) bar fixed at both ends (ii) bar fixed at the midpoint (iii) bar fixed at one end. Tuning fork.	Energy transport and transverse impedance.	Transverse wave propagation along a stretched string	15	YES		Assignment IV	1 hour	YES	

March 2024	08	**UNIT-V ULTRASONICS** Ultrasonics, properties of ultrasonic waves, production of ultrasonics by piezoelectric and magnetostrictive methods, detection of ultrasonics, determination of wavelength of ultrasonic waves. Applications and uses of ultrasonic waves.	determination of wavelength of ultrasonic waves	production of ultrasonics by piezoelectric and magnetostrictive methods,	15	Yes		Assignment V	1 hour	YES	

ANNUAL CURRICULAR PLAN II/IV/VI

YEAR: **2023-2024**

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
December 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 susceptibility.		Electrostatics Dielectrics	8 6	YES YES		Assignment I Assignment II	1 1	YES yes	
January	12	**3. Magnetostatics:** Biot-Savart's law and its applications: (i)	**Divergence and curl of**	Magnetostatics	10	YES		Assignment-III	01 Hour	YES	

2024		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.	**magnetic field,**	Moving charges in electric and magnetic fields Electromagnetic Induction	8 4	YES YES		Seminar Assignment IV	02 Hours 01 Hour	YES YES	
February 2024	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-Transistors and its operation, CB, CE and CC configurations, Input and output	**Hybrid parameters, Determination of hybrid parameters from**								

		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.	**transistor characteristics**								
March, 2024	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: 2023-2024

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

NAME OF THE LECTURER: **DR APV APPARAO**, **DR L MALLESWARA RAO, CH SUNDAR SINGH**

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
December 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	
January, 2024	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	**Bohr's principle of complementarity.**		09	Yes		Student seminar I Assignment II	1	Yes	

		single slit) and 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	
February 2024	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),	**Characteristics of nuclear forces- Yukawa's meson theory**		09	Yes Yes		PPT Assignment IV Career Guidance Class	1 1 1	Yes YES Yes	

		Distinct properties of nano materials (Mention-*mechanical, optical, electrical, and magnetic properties*); Mention of applications of nano materials: (*Fuel cells, Phosphors for HD TV, Next Generation Computer chips, elimination of pollutants, sensors*)									
March 2024	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 I/III/V

YEAR: **2023-2024**
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**

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
August, 2023	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	
September 2023	12	**UNIT-III PRINCIPLES OF REFRIGERATION** Introduction to Refrigeration- Natural and	**applications of Refrigeration**	Types of	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**	refrigeration - Vapor compression and vapor absorption refrigeration systems,							
October 2023	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	
November 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 I/III/V

YEAR: 2023-2024

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, & 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
August 2023	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	
September 2023	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 collector, solar water heating system, natural and forced circulation types. Concentrating	**Solar Thermal Power Plant**	Types of Thermal collectors, Flat plate collector – liquid heating type, Energy balance equation and efficiency,	12	Yes Yes		Assignment II PPT I Assignment III Career Guidance Class	1 1 1 1	Yes Yes Yes Yes	

		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**								
October 2023	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	
November 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	