DEPARTMENT OF PHYSICS

TEACHING PLAN 2022-2023

Academic-Pedagogical-Evaluation

Pedagogy:	P_1	Black Board Method
	P_2	Demonstration
	P_3	Question andAnswer
	P_4	Practice
	P_5	ICT(Audio and Video)
	P_6	ICT(Virtual and Online Learning)
	P_7	Assignment(written)
	P_8	Guest Lecture
	P_9	Hands on Practice
	P_{10}	Seminar
	P_x	Problem solving
	P_Q	Quiz
	P_t	Test
External: Internal Evaluation	75:25	

Academic-Pedagogical-Evaluation: Course Overview

Course: **B.Sc (M.P.C&M.P.CS)**	**Year: I**	**Semester:1**
Paper:	**MECHANICS,WAVES &OSCILLATIONS**	
Units:	1. Mechanics of Particles &Rigid Bodies 2. Motion in a central Force Field. 3. Relativistic Mechanics 4. Undaamped,Damped,Forced Oscillations &Coupled Oscillations 5. Vibrating Strings & Ultrasonics	
Duration:	60hours	
Learning Objectives	*Understandtheconceptof Mechanics,Waves&Oscillations. *Understanding Newton Laws of Motion,Keplar Laws of Motion *Explain Different methods to produce Ultrasonics,Michelson Morley Experiments *Explain phenomenons of Simple Harmonic Motion,Damped Oscillations,Forced Oscillations. *Study Application of Motion of Rocket,Applications of Ultrasonics. *solving derivations and problems.	
ResourceMaterial:	**StudyMaterial(Handouts):** https://www.tutorialspoint.com **ReferenceBooks:** ❖ B. Sc. Physics, Vol.1, Telugu Academy, Hyderabad ❖ Fundamentals of Physics Vol. I - Resnick, Halliday, Krane ,Wiley India 2007 ❖ College Physics-I. T. Bhimasankaram and G. Prasad. Himalaya Publishing House. ❖ University Physics-FW Sears, MW Zemansky& HD Young,Narosa Publications,Delhi **YouTube Links:** **https://youtu.be/d0_Eff4MXwM** **Power Point Presentations:** **https://youtu.be/dRra4QRDmOA**	

Academic-Pedagogical-Evaluation:Unit-wise Pedagogy

Unit-I	**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.				
Pedagogy	P1,P2,P3,P4,P5,P6				
Pedagogy-Evaluation	PQ	P6	-	-	PT
IE	2	2	-	-	1

Unit-II	**1. Motion in a Central Force Field** 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, Basic idea of Global Positioning System (GPS), weightlessness, Physiological effects of astronauts				
Pedagogy	P1,P3,P6,P4,P2,P5				
Pedagogy-Evaluation	PQ	P3	-	-	PT
IE	1	2	-	-	2

Unit-III	1. 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				
Pedagogy	P1,P2,P3,P6,P4,P5				
Pedagogy-Evaluation	PQ	P6	-	-	PT
IE	2	2	-	-	4

Unit-IV	1. Undamped, Damped and Forced oscillations: Quality factor. 2. Coupled oscillations: Coupled oscillators-Introduction, Two coupled oscillators, Normal coordinates and Normal modes- N-coupled oscillators and wave equation				
Pedagogy	P1,P3,P2,P4,P5,P6				
Pedagogy-Evaluation	PQ	P4	-	-	PT
IE	2	2	-	-	4

<table>
<tr><td>Unit-V</td><td colspan="5">1. 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 andHarmonics,Melde’s strings.

2. Ultrasonics:
Ultrasonics, General Properties of ultrasonic waves, Production of ultrasonics by piezoelectric and magnetostriction methods, Detection of ultrasonics, Applications of ultrasonic waves, SONAR</td></tr>
<tr><td>Pedagogy</td><td colspan="5">P1,P2,P3,P5,P6,P4</td></tr>
<tr><td>Pedagogy-Evaluation</td><td>PQ</td><td>P4</td><td></td><td></td><td>PT</td></tr>
<tr><td>IE</td><td>2</td><td>1</td><td>-</td><td>-</td><td>2</td></tr>
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WAVE OPTICS LESSON PLAN

PHYSICS

I. Academic-Pedagogical-Evaluation:CourseOverview

Subject:PHYSICS	**Year: I**	**Semester:II**
Course:	**PAPER-2 WAVEOPTICS**	
Units:	1. Interference of light 2. Diffraction of light 3. Polarisation of light 4. Aberrations and Fibre Optics 5. Lasers and Holography	
Duration:	**60hours**	
LearningObjectives	This course is designed to provide the students to understand the advanced concepts and applications of wave optics so that the students can pursue higher studies. Students will learn the application of mathematics in the derivations of various formulae. The topics like interference, diffraction and polarisation provide the dayto-day life examples and help them to understand what is happening around them. Advanced topics like LASERs, holography and optical fibres will create interest among the students regarding the advances made in the recent past in physics and students will be able to understand the modern Communication System	

Academic-Pedagogical-Evaluation:Unit-wisePedagogy

Subject:	**Physics**				
Year-Semester:	IYear - IISemester				
Paper	**Wave Optics**				
Units	U1	U2	U3	U4	U5
Hours Split:Total: 60	12	12	10	12	14
InternalEvaluationTotal: 40marks	10	10	5	5	10

Unit-I	Interference of light			
Syllabus	Introduction Conditions for interference of light Interference of light by division of wave front and amplitude Phase change on reflectionStokes' treatment, Lloyd's singlemirror Interference in thin films: Plane parallel and wedge-shaped films Colours in thin films Newton's rings in reflected lightTheory and experiment, Determination of wavelength			
Prerequisites	Definition and types of waves			
Pedagogy	P_1, P_3, P_4, P_5, P_6, P_8,P_9,P_X			
Pedagogy Evaluation	P7	PQ	PT	Total IE
IE	3	2	5	10

UNIT-II	Diffraction of light: Introduction, Types of diffraction: Fresnel and Fraunhoffer diffractions, Distinction between Fresnel and Fraunhoffer diffraction,Fraunhoffer diffraction at a single slit, Plane diffraction grating,Determination of wavelength of light using diffraction grating, Resolving pwer of grating, Fresnel's half period zones, Explanation of rectilinear propagation of light, Zone plate, comparison of zone plate with convex lens.			
Pedagogy	P_1,P2,P3,PT,P5,,P6,P10,			
Pedagogy-Evaluation	PQ	P10	P7	IE
IE	5	3	2	10

Unit-III	Polarisation of light:(12hrs) 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, Basic principle				
Pedagogy	P1,P2,,P7,P8,PX.P10.				
Pedagogy-Evaluation	P7	PX			IE
IE	3	2	-	-	5

Unit-IV	Aberrations and Fibre Optics: 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. Fibre optics: Introduction to Fibers, different types of fibers, rays and modes in an optical fiber, Principles of fiber communication , Advantages of fiber Optic Communication		
Pedagogy	P1,P5,P6,PQ,PT,P10		
Pedagogy-Evaluation	PT	PQ	IE
IE	2	3	5

Unit-V	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				
Pedagogy	P1,P3,P7,P5,P6,P8,				
Pedagogy-Evaluation	P7	P10	PQ	PT	IE
IE	2	2	3	3	10

HEAT AND THERMODYNAMICS LESSON PLAN

I. Academic-Pedagogical-Evaluation:CourseOverview

Course: **B.SC**	**Year: I**	**Semester:III**
Subject:Physics	**HEAT AND THERMODYNAMICS**	
Units:	1.kinetic theory of gases 2.thermodynamics 3.thermodynamic potentials and maxwells equations 4.low temperature physics 5,quantum theory of radiation	
Duration:	60hours	
LearningObjectives	*****Understand the concept of Transport phenomenon,Isothermal and Adiabatic Process,Adiabatic Demagnetisation *Define Entropy,Blackbody *Explain types of methods for producing Low Temperatures *Understanding the working of Carnots Engine,Angstrom Pyrheliometer *understanding derivations of Planck's Radiation law and derivation of different laws from Planck's Radiation law *solving the problems on Carnot's Engine Efficiency,inversion Temperature,Temperature of the sun	

ResourceMaterial:	**ReferenceBooks:** BSc Physics, Vol.2, Telugu Akademy, Hyderabad Thermodynamics, R.C.Srivastava, S.K.Saha&AbhayK.Jain, Eastern Economy Edition. Unified Physics Vol.2, Optics & Thermodynamics, Jai PrakashNath&Co.Ltd., Meerut Fundamentals of Physics. Halliday/Resnick/Walker.C. Wiley India Edition 2007 Heat and Thermodynamics -N BrijLal, P Subrahmanyam, S.Chand& Co.,2012 **YouTube Links:** **https://www.youtube.com/watch?v=n7YavgJPkuw** **Power Point Presentations:** https://www.academia.edu/19635118/He_Ne_Laser **QuestionBank:** http://snehajobs.com/ii-sem-physics-wave-optics/

I. Academic-Pedagogical-Evaluation:Unit-wisePedagogy

Subject:	**Physics**				
Year-II B.SC	IIYear - III Semester				
Paper	**HEAT AND THERMODYNAMICS**				
Units	U1	U2	U 3	U4	U5
Hours Split:Total: 60	10	12	1 4	10	14
InternalEvaluation Total: 25marks	5	5	5	5	5

Unit-I	KINETIC THEORY OF GASES Kinetic Theory of gases-Introduction, Maxwell's law of distribution of molecular velocities (qualitative treatment only) and its experimental verification,Mean free path, Degrees of freedom, Principle of equipartition of energy (Qualitative ideas only), Transport phenomenon in ideal gases: viscosity, Thermal conductivity and diffusion of gases.,				
Pedagogy	P1,P2,P3,P4,P5,P6				
Pedagogy-Evaluation	PQ	P6	-	-	PT
IE	2	1	-	-	2

Unit-II	**UNIT-II: Thermodynamics: (12hrs)** Introduction- Isothermal and Adiabatic processes, Reversible and irreversible processes, Carnot's engine and its efficiency, Carnot's theorem, Thermodynamic scale of temperature and its identity with perfect gas scale, Second law of thermodynamics: Kelvin's and Clausius statements, Principle of refrigeration, Entropy, Physical significance, Change in entropy in reversible and irreversible processes; Entropy and disorder-Entropy of Universe; Temperature-Entropy (T-S) diagram and its uses ; change of entropy when ice changes into steam..				
Pedagogy	P1,P3,P6,P4,P2,P5				
Pedagogy - Evaluation	PQ	P3	-	-	PT
IE	1	2	-	-	1

Unit-III	**UNIT-III: Thermodynamic Potentials and Maxwell's equations: (12hrs)** Thermodynamic potentials-Internal Energy, Enthalpy, Helmholtz Free Energy, Gibb's Free Energy and their significance, Derivation of Maxwell's thermodynamic relations from thermodynamic potentials, Applications to (i) Clausius-Clayperon's equation (ii) Value of C_P-C_V (iii) Value of C_P/C_V (iv) Joule-Kelvin coefficient for ideal and Van der Waals' gases				
Pedagogy	P1,P2,P3,P6,P4,P5				
Pedagogy-Evaluation	PQ	P6	-	-	PT
IE	1	1	-	-	2

Unit-IV	**UNIT-IV: Low temperature Physics: (12hrs)** Methods for producing very low temperatures, Joule Kelvin effect, Porous plug experiment , Joule expansion, Distinction between adiabatic and Joule Thomson expansion, Expression for Joule Thomson cooling, Liquefaction of air by Linde's method, Production of low temperatures by adiabatic demagnetization (qualitative), Practical applications of substances at low Temperatures				
Pedagogy	P1,P3,P2,P4,P5,P6				
Pedagogy-Evaluation	PQ	P4	-	-	PT
IE	2	1	-	-	2

Unit-V	UNIT- **UNIT-V: Quantum theory of radiation: (12 hrs)** Blackbody and its spectral energy distribution of black body radiation, Kirchoff's law, Wein's displacement law, Stefan-Boltzmann's law and Rayleigh-Jean's law (No derivations), Planck's law of black body radiation-Derivation, Deduction of Wein's law and Rayleigh-Jean's law from Planck's law, Solar constant and its determination using Angstrom pyroheliometer, Estimation of surface temperature of Sun..				
Pedagogy	P1,P2,P3,P5,P6,P4				
Pedagogy-Evaluation	PQ	P4			PT
IE	2	2	-	-	1

*ELECTRICITY, MAGNETISM&ELECTRONICS*PHYSICSLESSON PLAN

I. Academic-Pedagogical-Evaluation:CourseOverview

Subject:PHYSICS	**Year: III**	**Semester:V**
Course:	**PAPER-5.1ELECTRICITY,MAGNETISM&ELECTRONICS**	
Units:	1.Electricfield Intensity and Potential&Dielectrics 2. Electric and Magneticfields&Electromagnetic Induction 3. Alternating Currents, Electro Magnetic Waves& Maxwells Equations 4. Basic Electronics 5. Digital Electronics	
Duration:	**60hours**	
LearningObjectives	This unit is designed to provide the students to understand the advanced concepts so students can persure higher studies.Students will learn the application of mathematics in the derivation of various formulae.The study of Electronics help the students to understand the usage of electric devices.	
Course Outcomes	On Completion of this course the students will able to 1.Define Electric field Intensity,Potential,SelfInduction,Mutual Induction phenomenon. 2.Understand the concepts needed to understanding the transformer,Transistors,Diodes,Logicgates,HalfAdder and FullAddder. 3.Apply mathematical techniques to derive laws and for analyzing and solving problems. 4,Design set up and carry out experiments analyze data,compare with theoretical predictions and understand the orders of magnitude of various quantities.	

Prerequisites	Knowledge of 1.definitions and different laws 2.Understand the application of various devices.
Resource Material:	1. BSc Physics, Vol.3, Telugu Academy, Hyderabad. 2. Electricity and Magnetism, D.N. Vasudeva. S. Chand & Co. 3. Electricity, Magnetism with Electronics, K.K.Tewari, R.Chand& Co., 4. Principles of Electronics, V.K. Mehta, S.Chand& Co., 5. Digital Principles and Applications, A.P. Malvino and D.P.Leach, Mc GrawHill Edition. 6. Unified Physics,Electricity,Magnetism &ElectronicsDr.S.L.Gupta,SanjeevGupta **Hand outs:** 1.http://www.ee.surrey.ac.uk/Projects/CAL/digital-logic/gatesfunc/index.html 2. https://byjus.com/jee/transistor/ **YOUTUBE LINKS:** 1. https://www.youtube.com/watch?v=UJBOoFdhWCY 2. https://www.youtube.com/watch?v=tLM54O11qy0 3. https://www.youtube.com/watch?v=MZPeRlst8rQ **DEMONSTRATION VIDEOS:** 1. https://www.youtube.com/watch?v=AgoplKn11f4 2. https://www.youtube.com/watch?v=bqV1_S4-Xl0

II.Academic-Pedagogical-Evaluation:Unit-wisePedagogy

Subject:	**Physics**				
Year-Semester:	IIIYear - VSemester				
Paper	**Electricity,Magnetism&Electronics**				
Units	U1	U2	U 3	U4	U5
Hours Split:Total: 60	12	12	1 2	12	12
InternalEvaluationTotal: 40marks	10	10	1 0	5	5

Unit-I	Electric Field IntensityPotential&Dielectrics			
Syllabus	**1**. Gauss's law statement and its proof- Electric field intensity due to (1) Uniformly charged sphere and (2) an infinite conducting sheet of charge. Electrical potential – equipotential surfaces- potential due to i) a point charge, ii)charged spherical shell and uniformly charged sphere. **2. Dielectrics:** Electric dipolemoment and molecular polarizability- Electric displacement D, electric polarization P – relation between D, E and P- Dielectric constant and susceptibility. Boundary conditions at the dielectric surface			
Pedagogy	P1,P2,P3,PT,P5,,P6,P10,			
Pedagogy Evaluation	P7	PQ	PT	Total IE
IE	3	2	5	10

UNIT2	**3. Electric and magnetic fields** Biot-Savart's law, explanation and calculation of B due to long straight wire, a circular current loop and solenoid – Lorentz force – Hall effect – determination of Hall coefficient and applications. **4. Electromagnetic induction** Faraday's law-Lenz's law- Self and mutual inductance, coefficient of coupling, calculation of self inductance of a long solenoid, energy stored in magnetic field.Transformer - energy losses - efficiency.			
Pedagogy	P_1,P2,P3,PX,PQ,P8			
Pedagogy-Evaluation	PQ	PX		IE
IE	5	5		10

Unit-III	**5. Alternating currents and electromagnetic waves** Alternating current - Relation between current and voltage in LR and CR circuits,vector diagrams, LCR series and parallel resonant circuit, Q –factor, power in ac circuits. **6. Maxwell's equations** Idea of displacement current - Maxwell's equations (integral and differential forms) (no derivation), Maxwell's wave equation (with derivation), Transverse nature of electromagnetic waves.Poynting theorem (statement and proof), production of electromagnetic waves (Hertz experiment).			
Pedagogy	P1,P3,,PX,,P7			
Pedagogy-Evaluation	P7	PX	P3	IE
IE	3	4	3	10

Unit-IV	**7. Basic electronics:** PN junction diode, Zener diode, Tunnel diode, I-V characteristics, PNP and NPN transistors, CB, CE and CC configurations – Relation betweenα, β and γ - transistor (CE) characteristics - Determination of hybrid parameters, Transistor as an amplifier.		
Pedagogy	P1,P2,P8.P10,PQ,PT		
Pedagogy-Evaluation	PT	PQ	IE
IE	2	3	5

Unit-V	**8. Digital electronics** Number systems - Conversion of binary to decimal system and vice versa.Binary addition and subtraction (1's and 2's complement methods).Laws of Boolean algebra - De Morgan's laws-statement and proof, Basic logic gates, NAND and NOR as universal gates, exclusive-OR gate, Half adder and Full adder, Parallel adder circuits.				
Pedagogy	P1,P2,P3,PX				
Pedagogy - Evaluation	PX	P10			IE
IE	2	3			5

MODERN PHYSICS LESSON PLAN

I. Academic-Pedagogical-Evaluation:CourseOverview

Course: B.Sc (M.P.C&M.P.CS)	**Year: I**	**Semester:1**
Paper:VI	Modern Physics	
Units:	1. Atomic and molecular physics 2. Matter waves & Uncertainty Principle 3. Quantum (wave) mechanics 4. General Properties of Nuclei . and Radioactivity decay: 5. Crystal Structure and . Superconductivity:	
Duration:	60hours	
LearningObjectives	*Understandtheconceptof vector atom model *Understanding the concept of Zeeman effect and its experimental arrangement *davission germer experiment *Understand the concepts of schrodinger time independent and dependent wave equations *Understand the concepts of properties of NANO materials *Type 1 and type 2 conductors and bcs theory applications of super conductors *solving derivations and problems.	

ResourceMaterial:	**StudyMaterial(Handouts):** https://www.gvrjobs4u.com/p/physics.html# **ReferenceBooks:** **REFERENCE BOOKS** BSc Physics, Vol.4, Telugu Akademy, Hyderabad Atomic Physics by J.B. Rajam; S.Chand& Co., Modern Physics by R. Murugeshan and Kiruthiga Siva Prasath. S. Chand & Co Nano materials, A K Bandopadhyay. New Age International Pvt Ltd (2007) Textbook of Nanoscience and Nanotechnology, BS Murthy, P Shankar, Baldev Raj,BB Rath and J Murday-Universities Press-IIM **YouTube Links:** **https://www.youtube.com/watch?v=M0lSpA154k0** **Power Point Presentation:** **https://www.slideserve.com/cissy/davisson-germer-experiment**

II. Academic-Pedagogical-Evaluation:Unit-wisePedagogy

Subject:	**PHYSICS**				
Year-Semester:	I Year - 1 Semester				
Paper	**Modern Physics**				
Units	U1	U2	U 3	U4	U5
Hours Split:Total: 60	10	12	1 4	10	14
InternalEvaluationTotal: 25marks	5	5	5	5	5

Unit-I	**1. Atomic and molecular physics** **UNIT-I :** **1. Atomic and Molecular Physics:(12 hrs)** 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.				
Pedagogy	P1,P2,P3,P4,P5,P6				
Pedagogy - Evaluation	PQ	P 6	-	-	PT
IE	2	2	-	-	1

Unit-II	**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, 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 photons(Gamma ray microscope),Bohr's principle of complementarity.				
Pedagogy	P1,P3,P6,P4,P2,P5				
Pedagogy-Evaluation	PQ	P3	-	-	PT
IE	1	2	-	-	2

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 particle in one dimensional infinite boxand one dimensional oscillator				
Pedagogy	P1,P2,P3,P6,P4,P5				
Pedagogy-Evaluation	PQ	P6	-	-	PT
IE	2	2	-	-	4

Unit-IV	**1. General Properties of Nuclei** **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				
Pedagogy	P1,P3,P2,P4,P5,P6				
Pedagogy-Evaluation	PQ	P4	-	-	PT
IE	2	2	-	-	4

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 properties*); Mention of applications of nano materials: (*Fuel cells,Phosphors for HD TV, Next Generation Computer chips, elimination of pollutants, sensors*) **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				
Pedagogy	P1,P2,P3,P5,P6,P4				
Pedagogy-Evaluation	PQ	P4			PT
IE	2	1	-	-	2

LOW TEMPERATURE PHYSICS AND REFRIGRATION LESSON PLAN

III. Academic-Pedagogical-Evaluation:CourseOverview

Course: **B.SC**	**Year: III**	**Semester:V**
Subject:Physics	**LOW TEMPERATURE PHYSICS AND REFRIGRATION**	
Units:	1.production of low temperatures 2.measurement of low temperature 3.principles of refrigration 4.components of refrigration 5.applications of low temperature and refrigration	
Duration:	60hours	
LearningObjectives	*****Understand the classification ,properties of Refrigrents and their Effects on Environment *Identify various methods and Techniques used to produce low Temperatures in the Laboratory. *Understanding the working of Gas Thermometers,Vapou Pressure Thermometers,magnetic Thermometers *understanding the different Refrigrator components ,Types of Compressors,Evaporators, and condensora and their functional aspects. *Comprehend the applications of Low Temperature Physics and Refrigration	

Resource Material:	**ReferenceBooks:** • Heat andThermodynamics by Brij Lal &N.Subramanyam • Thermal Physics by S C.GargR M Bansal&C.K Ghosh,McGrawhill Education. • Low Temperature Physics byChristianE.SigfriedH.Springer **YouTube Links:** **https://www.youtube.com/watch?v=Nh71u8LycKc** **Power Point Presentations:** **https://www.slideshare.net/ssmvjunwani/thermodynamics-137086320** **QuestionBank:** **https://www.jagannathuniversity.org/assets/jnu-docs/others/question-paper-bank/QuestionbankMech.pdf**

IV. Academic-Pedagogical-Evaluation:Unit-wisePedagogy

Subject:	**Physics**				
Year-Semester:	IYear - VSemester				
Paper	**Low Temperature Physics and Refrigeration**				
Units	U1	U2	U 3	U4	U5
Hours Split:Total: 60	10	12	1 4	10	14
InternalEvaluationTotal: 25marks	5	5	5	5	5

Unit-I	PRODUCTION OF LOW TEMPERATURE Production of Low Temperature-Introduction Freezing mixtures,Joule Thomson Effect,Regenrative cooling,Different methods of Liquification of Gases,Liqufication of air, ,Liquification of Air Production of liquid Hydrogen and Nitrogen,Adiabatic Demagnetisation,Properties of materials at Low Temperaures and Super conductivity				
Pedagogy	P1,P2,P3,P4,P5,P6				
Pedagogy - Evaluation	PQ	P6	-	-	PT
IE	2	1	-	-	2

Unit-II	MEASUREMENT OF LOW TEMPERATURES Gas Thermometer and its correction and calibration,Secondaty Thermometers and Resistance Thermometers,Thermocouples Vapour Pressure thermometers,Magnetic Thermometers Advantages and Drawbacks of Each Thermometer				
Pedagogy	P1,P3,P6,P4,P2,P5				
Pedagogy - Evaluation	PQ	P3	-	-	PT
IE	1	2	-	-	1

Unit-III	PRINCIPLESOF REFRIGRATION Introduction to Refrigration,Natural and Artificial Refrigration,stages of Refrigration,Types of Refrigration,Vapour Compression and Vapour Absorption Refrigration systems,Refrigration cycle and Explanation with block diagram,Introductary ideas on Air Conditioning Refrigrants-Introduction Ideal Refrigrent,Properties of Refrigrent,Classification of Refrigrents commonly used Refrigrents,Eco friendly Refrigrents				
Pedagogy	P1,P2,P3,P6,P4,P5				
Pedagogy-Evaluation	PQ	P6	-	-	PT
IE	1	1	-	-	2

Unit-IV	COMPONENTS OF REFRIGRATOR Refrigrator and its working,Block Diagram,Coefficien of Performance (COP),Tons of Refrigration(TR),Energy Efficiency Ratio(EER)<Refrigrator Components,Types of Compressors,evaporators and Condensors and their functional aspects,Defrosting in a Refrigrator,Refrigant Leakage and detection.l				
Pedagogy	P1,P3,P2,P4,P5,P6				
Pedagogy-Evaluation	PQ	P4	-	-	PT
IE	2	1	-	-	2

Unit-V	UNIT-V APPLICATIONS OF LOW TEMPERATURES Preservation of Biological materials,Food Freezing,liquid Nitrogen and Liquid Hydrogen in medicalfield,Superconducing magnets in MRI,Tissue Ablation,Cryosurgery-Crogenic rocket propulsion system .				
Pedagogy	P1,P2,P3,P5,P6,P4				
Pedagogy-Evaluation	PQ	P4			PT
IE	2	2	-	-	1

SOLAR ENERGY AND ITS APPLICATIONS LESSON PLAN

V. Academic-Pedagogical-Evaluation:CourseOverview

Course: **B.SC**	**Year: III**	**Semester:V**
Subject:Physics	**SOLAR ENERGY AND ITS APPLICATIONS**	
Units:	1. BASIC CONCEPTS OF SOLAR ENERGY 2. SOLAR THERMAL COLLECTORS 3. FUNDMENTALS OF SOLARCELLS 4. TYPES OF SOLARCELLS AND MODULES 5. SOLAR PHOTO VOLTAIC SYSTEMS	
Duration:	60hours	
LearningObjectives	*****Understand the concept of solar constant ,zenith angle,Semiconductor Interface *****Understanding Sun Structure ,forms of Energy coming from the sunand its measurement *Acuire a critical knowledge on the working of Pyrometer ,Pyroheliometer,Solar water heater. *Comprehend Applications of Thermal Collectors and PV Modules	

ResourceMaterial:	**ReferenceBooks:** • Solar Energy Utilization by G.D.Rai Khanna Publishers • Solar Energy fundamentals,design,modelling and applications by G.N.Tiwari,Narosa Publications,2005 • Solar Energy principles of thermal energy collection and Energy storage by S.P.Suckatme,Tata and MeGraw Hill Publications **YouTube Links:** **https://www.youtube.com/watch?v=n7YavgJPkuw** **Power Point Presentations:** https://www.academia.edu/19635118/He_Ne_Laser **QuestionBank:** http://snehajobs.com/ii-sem-physics-wave-optics/

VI. Academic-Pedagogical-Evaluation:Unit-wisePedagogy

Subject:	**Physics**				
Year-Semester:	IYear - I Semester				
Paper	**Wave optics**				
Units	U1	U2	U 3	U4	U5
Hours Split:Total: 60	10	12	1 4	10	14
InternalEvaluationTotal: 25marks	5	5	5	5	5

unit-I	BASIC CONCEPTS OF SOLAR ENERGY 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.Pyrheliometer-working principle,direct radiation measurements,Pyrometer-working principle,diffuse radiation measurement,distinction between the two meters				
Pedagogy	P1,P2,P3,P4,P5,P6				
Pedagogy-Evaluation	PQ	P6	-	-	PT
IE	2	1	-	-	2

Unit-II	SOLAR THERMAL COLLECTORS Solar thermal collectors-introduction,types of thermal collectors ,flate plate collector-liquid heating type,energy balance equation and efficiency,Evacuated tube collector,collector overall heat loss coefficient,definition of collector efficiency factor,collector heat-removal factor and collector flow factor,testing of flat plate collector,solar water heating system,natural and forced circulation types Concentrating collectors,solar cookers,solar dryear,solar desalinators				
Pedagogy	P1,P3,P6,P4,P2,P5				
Pedagogy-Evaluation	PQ	P 3	-	-	PT
IE	1	2	-	-	1

Unit-III	FUNDAMENTALS OF SOLAR CELLS Semiconductors interface. Types,homo junction,hetero junction and cshottky barrier,advantages and draw backs,photo voltaic,equivalent circuit,output,parameters,conversion efficiency,quantum efficiency.Measurement of I-V charecterstics,series and shunt resistance,their effect on efficiency,Effect of light intensity,inclination and temperature on efficiency				
Pedagogy	P1,P2,P3,P6,P4,P5				
Pedagogy - Evaluation	P Q	P 6	-	-	PT
IE	1	1	-	-	2

Unit-IV	TYPES OF SOLAR CELLS AND MODULES Types of solar cells,crystalline silicon solar cells,I-V characterstics,poly silicon cells,Amorphous silicon cells ,Thin film solar cells-CdTe/CdS and CullGaSe2/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				
Pedagogy	P1,P3,P2,P4,P5,P6				
edagogy-Evaluation	PQ	P4	-	-	PT
IE	2	1	-	-	2

Unit-V	SOLAR PHOTOVOLTAIC SYSTEMS Energy storage PV systems.Enegy storage modes,electrochemical storage,Batteries Primary and secondary,Solid-State battery,Molten solvent battery,lead acid battery and dry batteries,Mechanical storage-Flywheel,Electrical storage-Super capacitor.				
Pedagogy	P1,P2,P3,P5,P6,P4				
Pedagogy-Evaluation	PQ	P4			PT
IE	2	2	-	-	1