DEPARTMENT OF PHYSICS

TEACHING PLAN 2023-2024

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	70:30	

Academic-Pedagogical-Evaluation: Course Overview

Course: **B.Sc HONOURS PHYSICS**	**Year:II**	**Semester:III**
Paper:Course 3	**OPTICS**	
Units:	1 . ABERRATIONS 2. INTERFERENCE 3. DIFFRACTION 4. POLORIZATIONS 5. LASERS AND HOLOGRAPHY	
Duration:	60hours	
Learning Objectives	• Explain about the different aberrations in lenses and discuss the methods of minimizing them • Understand the phenomenon of interference of light and its formation in (i) Lloyd's single mirror due to division of wave front and (ii) Thin films, Newton's rings and Michelson interferometer due to division of amplitude. • Distinguish between Fresnel's diffraction and Fraunhoffer diffraction and observe the diffraction patterns in the case of single slit and the diffraction grating and to describe the construction and working of zone plate and make the comparison of zone plate with convex lens	
ResourceMaterial:	**StudyMaterial(Handouts):** https://www.youtube.com/watch?v=KsCfRPEGv9U **ReferenceBooks:** ❖ **BSc Physics, Vol.2, Telugu Academy, Hyderabad** ❖ **A Text Book of Optics-N Subramanyam, L Brijlal, S.Chand& Co.** ❖ **Unified Physics Vol.II Optics & Thermodynamics – Jai Prakash Nath&Co.Ltd., Meerut** ❖ **Optics,F.A. Jenkins and H.G. White, Mc Graw-Hill** **YouTube Links:** **https://www.youtube.com/watch?v=SKozK4WfWLo** **Power Point Presentations:** **https://www.youtube.com/watch?v=s6pQf7EyFoo**	

Academic-Pedagogical-Evaluation:Unit-wise Pedagogy

Unit-I	Aberrations Introduction – monocromtic aberration , spherical aberrations , methods of minimizing spherical aberration ,coma,astigmatism and curvature of field distortion .chromatic aberration the acromatic doublet . chromatioc for two lenses i.in contact and ii. Separated by a distance				
Pedagogy	P1,P2,P3,P4,P5,P6				
Pedagogy-Evaluation	PQ	P6	-	-	PT
IE	2	2	-	-	1

Unit-II	INTERFERENCE Principles of superpositions ,coherence conditions for interference of light .frenels biprism determination of wavelength of light – change of phase on reflection .oblique incidence of a plane wave on a thin flim due to reflected light (cosine law 0 clolours in thin flims interaces by a film with two non-parallel reflecting surface (wedge shaped film) determination of diameter of wire netons ring s in reflectd light . determination of wavelength of monochromaticlight using newtons rings and Michelson interferometer .				
Pedagogy	P1,P3,P6,P4,P2,P5				
Pedagogy-Evaluation	PQ	P3	-	-	PT
IE	1	2	-	-	2

Unit-III	DIFFRACTION Introduction distinction between frenels and fraunhoffer diffraction , fraunhoffer diffraction with N slits (diffraction granting . resolving powerof grating determination of wavelength of wavelength of light with normal incidence usinfg diffraction grating . frnels half period zone area of the hlf period zone plate comparision of zone plate of convex lens diffence between interference and diffration				
Pedagogy	P1,P2,P3,P6,P4,P5				
Pedagogy-Evaluation	PQ	P6	-	-	PT
IE	2	2	-	-	4

Unit-IV	POLARISATION Polarized light methods of polarization by reflection refraction ,double refraction , Brewster law , maluslaw , nicol prism and poloriser and analyser , quarter wave plate half wav plate and opticakl activity , determination of specific rotation by laurenzts half shade polorimeter, idea of elliptical circular polorisation				
Pedagogy	P1,P3,P2,P4,P5,P6				
Pedagogy-Evaluation	PQ	P4	-	-	PT
IE	2	2	-	-	4

Unit-V	LASER Introduction ,spontaneous emission , stimulated emission population inversion , laser principle Einstein co efficients types of laser He-Ne laser ruby laser , application of laser , holography - basic principles of holography gabor hologram and its limitations , application of hologram				
Pedagogy	P1,P2,P3,P5,P6,P4				
Pedagogy-Evaluation	PQ	P4			PT
IE	2	1	-	-	2

HEAT AND THERMODYNAMICS LESSON PLAN

PHYSICS

I. Academic-Pedagogical-Evaluation:CourseOverview

Subject:PHYSICS	**Year: II**	**Semester:III**
Course:	**COURSE:3 HEAT AND THERMODYNAMICS**	
Units	1. kinetic theory of gases 2. Thermodynamics 3. Thermodynamic Potentials and Maxwell equations 4. Low Temperature Physics 5. Quantum Theory of Radiation	
Duration:	**45 hours**	
LearningObjectives	1. Understandthebasicaspectsofkinetictheoryofgases,Maxwell-Boltzmann distribution law, equipartition of energies, mean free path of molecular collisions andthetransportphenomenon in ideal gases 2. Gain knowledge on the basic concepts of thermodynamics, the first and the second lawof thermodynamics, the basic principles of refrigeration, the concept of entropy, thethermodynamicpotentials and their physical interpretations. UnderstandtheworkingofCarnot'sidealheatengine,Carnot cycleanditsefficiency 3. Develop critical understanding of concept of Thermodynamic potentials,the formulation of Maxwell's equations and its applications.	

Academic-Pedagogical-Evaluation:Unit-wisePedagogy

Subject:	**Physics**				
Year-Semester:	IIYear - IIISemester				
Paper	**Mechanics and properties of matter**				
Units	U1	U2	U3	U4	U5
Hours Split:Total: 45	9	9	9	9	9
InternalEvaluationTotal: 40marks	10	10	5	5	10

Syllabus	KINETIC THEORY OF GASES			
Unit-I	Kinetic Theory of gases- Introduction, Maxwell's law of distribution of molecular velocities, Mean free path, Principle of equipartition of energy, Transport phenomenoninideal gases: viscosity and Thermal conductivity.			
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	THERMODYNAMICS: IntroductionReversibleandirreversibleprocesses,Carnot'sengineanditseffi ciency,Carnot'stheorem,Thermodyn amicscaleoftemperature, Second law of thermodynamics Entropy: Physical significance, Change in entropy inreversibleandirreversibleprocesses;Temperature-Entropy (T-S) diagram and its uses; change of entropy when ice changes into steam			
Pedagogy	P_1,P2,P3,PT,P5,,P6,P10,			
Pedagogy-Evaluation	PQ	P10	P7	IE
IE	5	3	2	10

Unit-III	THERMODYNAMICPOTENTIALSANDMAXWELL'S EQUATIONS ThermodynamicPotentialsInternalEnergy,Enthalpy,HelmholtzFreeEnergy,Gibb'sFreeEnergyandtheirsignificance,Derivationof Maxwell'sthermodynamicrelationsfromthermodynamicpotentials,Applicationsto(i)ClausiusClayperon'sequation(ii)Joule-Kelvin coefficientforideal andVanderWaals'gases.				
Pedagogy	P1,P2,,P7,P8,PX.P10.				
Pedagogy-Evaluation	P7	PX			IE
IE	3	2	-	-	5

Unit-IV	LOW TEMPERATUREPHYSICS: 9hrs Methodsforproducingverylowtemperatures,JouleKelvineffect,porousplugexperiment,Jouleexpansion,DistinctionbetweenadiabaticandJouleThomsonexpansion,ExpressionforJouleThomsoncooling ,Productionoflow temperaturesbyadiabaticdemagnetization(qualitative).		
Pedagogy	P1,P5,P6,PQ,PT,P10		
Pedagogy-Evaluation	PT	PQ	IE
IE	2	3	5

Unit-V	UNIT-V:QUANTUMTHEORY OF RADIATION Spectral energy distribution of black body radiation, Wein'sdisplacementlaw andRayleighJean'slaw(Noderivations),Planck's law of black body radiation-Derivation, Deduction of Wein's law and RayleighJean'slawfromPlanck'slaw,Solarconstantanditsdeterminationusing Angstrompyro heliometer,Estimation of surface temperature ofSun. .				
Pedagogy	P1,P3,P7,P5,P6,P8,				
Pedagogy-Evaluation	P7	P10	PQ	PT	IE
IE	2	2	3	3	10

ELECTRONIC DEVICES AND CIRCUITS LESSON PLAN

I.Academic-Pedagogical-Evaluation:CourseOverview

Course: **B.SC HONOURS PHYSICS**	**Year: II**	**Semester:III**
Subject:Physics	**ELECTRONIC DEVICES AND CIRCUITS**	
Units:	1.PNJunction Diodes 2.Bipolar junction transistor and biasing 3.FET and Power Electronics 4.Photo Electronic Devices and Power Supplies 5.Photo Electronic Devices	
Duration:	60hours	
LearningObjectives	1. Understand the behavior of P-N junction diodes in forward and reverse bias conditions and analyze the impact of junction capacitance on diode characteristics. 2. Analyze and compare the characteristics and operation of different BJT configurations (CB, CE, and CC) and demonstrate proficiency in biasing techniques. 3. Comprehend the operation and characteristics of FETs, including JFETs and MOSFETs, and explain the working principles and characteristics of UJTs	

ResourceMaterial:	ReferenceBooks: Electronic Devices and Circuit Theory --- Robert L. Boylestad & Louis Nashelsky. 2. Electronic Devices and Circuits I – T.L.Floyd- PHI Fifth Edition 3. Integrated Electronics – Millmam & Halkias. 4. Electronic Devices & Circuits – Bogart. 5. Sedha R.S., A Text Book Of Applied Electronics, S.Chand & Company Ltd YouTube Links: https://www.youtube.com/watch?v=cOICDYuY-gA Power Point Presentations: https://slideplayer.com/slide/4962297/

I. Academic-Pedagogical-Evaluation:Unit-wisePedagogy

Subject:	**Physics**				
Year-I B.SC HONOURS PHYSICS	IIYear - III Semester				
Paper	**ELECTRRONIC DEVICES AND CIRCUITS**				
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	P-N junction Diode, Formation of depletion region, Forward and Reverse bias Ideal Diode, Diode equation– Reverse saturation current – Tunnel Diode- Construction, working, V-I characteristics and Applications, Zener diode – V I characteristics, Applications.,				
Pedagogy	P1,P2,P3,P4,P5,P6				
Pedagogy-Evaluation	PQ	P6	-	-	PT
IE	2	1	-	-	2

Unit-II	BIPOLAR JUNCTION TRANSISTOR AND ITS BIASING: (D.C) Transistor construction, working of PNP and NPN Transistors, Active, Cutoff and Saturation conditions, Configurations of Transistor - CB, CE, and CC, Input and Output Characteristics of CB and CE configurations. Hybrid parameters of a Transistor and equivalent circuit,BJT Transistor Biasing – Need for stabilization, Thermal runaway, Stability factor, Biasing methods - Voltage-Divider Bias.				
Pedagogy	P1,P3,P6,P4,P2,P5				
Pedagogy - Evaluation	PQ	P3	-	-	PT
IE	1	2	-	-	1

Unit-III	FIELD EFFECT TRANSISTORS & POWER ELECTRONIC DEVICES Difference between JFET and BJT, Construction and working of JFET, Drain and Transfer Characteristics,MOSFET - Depletion-type, and Enhancement-Type MOSFETs. FET Biasing: Voltage Divider Biasing. UJT- Construction, working, V-I characteristics. SCR – Construction, Working and Characteristics
Pedagogy	P1,P2,P3,P6,P4,P5

Pedagogy-Evaluation	PQ	P6	-	-	PT
IE	1	1	-	-	2

Unit-IV	:PHOTO ELECTRIC DEVICES: Light-Emitting Diodes (LEDs) - Construction, working, characteristics and Applications, IR Emitters, Photo diode - Construction, working characteristics and Applications, Phototransistors - Construction, working and characteristics,Applications, Structure and operation of LDR, Applications UNIT				
Pedagogy	P1,P3,P2,P4,P5,P6				
Pedagogy-Evaluation	PQ	P4	-	-	PT
IE	2	1	-	-	2

Unit-V	POWER SUPPLIES Rectifiers:Half wave, Full wave and bridge rectifiers-Efficiency (with derivations), ripple factor- Zener diode as Voltage Regulator, Filters-choke input (inductor), L-section, π-section filters. Three terminal fixed voltage IC-regulators(78XX and 79XX)				
Pedagogy	P1,P2,P3,P5,P6,P4				
Pedagogy-Evaluation	PQ	P4			PT
IE	2	2	-	-	1

ANALOG AND DIGITAL ELECTRONICS PHYSICSLESSON PLAN

I. Academic-Pedagogical-Evaluation:CourseOverview

Subject:PHYSICS	**Year: II**	**Semester:III**
Course:8	**PAPER- 5.ANALOG AND DIGITALELECTRONICS**	
Units:	1. OPERATIONAL AMPLIFIERS 2. PRACTICAL OPERATIONAL AMPLIFIER AND APPLICATIONS 3. NUMBER SYSTEMS, CODES AND LOGIC GATES 4. ARITHMETIC CIRCUITS & DATA PROCESSING CIRCUITS 5. SEQUENTIAL LOGIC CIRCUITS & CODE CONVERTERS a	
Duration:	**60hours**	
LearningObjectives	Understand Principles and Working of Operational Amplifier 2. Apply their knowledge on OP-Amp in different Applications 3. To understand the number systems, Binary codes and Complements. 4. To understand the Boolean algebra and simplification of Boolean expressions. 5. To analyze logic processes and implement logical operations using combinational logic circuits. 6. To understand the concepts of sequential circuits and to analyze sequential systems in terms of state machines.	
Course Outcomes	On Completion of this course the students will able to 1. . 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.	

Resource Material:	1. OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, Prentice Hall 2. Operational Amplifiers and Linear ICs, David A. Bell, 3rd Edition, 2011, 3. Digital Principles and Applications, A.P. Malvino, D.P.Leach and Saha, 7th Ed., TMH 4. Fundamentals of Digital Circuits, Anand Kumar, 2nd Edn, 2009, PHI Learning Pvt. Ltd. 5. Thomas L. Flyod, Digital Fundamentals, Pearson Education Asia (1994) 6. R. L. Tokheim, Digital Principles, Schaum's Outline Series, Tata McGraw- Hill (1994) Hand outs: YOUTUBE LINKS: 1. https://www.youtube.com/watch?v=fmRHDqcodS4 2. https://www.youtube.com/watch?v=kgL5UaSVuro

II.Academic-Pedagogical-Evaluation:Unit-wisePedagogy

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

Subject:	**Physics**				
Year-Semester:	IIIYear - VSemester				
Paper	**Electricity,Magnetism&Electronics**				
Units	U1	U2	U3	U4	U5
Hours Split: Total: 60	12	12	12	12	12
InternalEvaluationTotal: 40marks	10	10	10	5	5

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: III**	**Semester:IV**
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:	III YEAR – IV 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:	IIIYear - IV SEMESTER				
Paper	**Low Temperature Physics and Refrigeration**				
Units	U1	U2	U3	U4	U5
Hours Split:Total: 60	10	12	14	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:	IIIYear - V Semester				
Paper	**Solary Energy And Applications**				
Units	U1	U2	U3	U4	U5
Hours Split:Total: 60	10	12	14	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	P3	-	-	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	PQ	P6	-	-	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