

22MEHO107	MATERIALS FOR SOLAR DEVICES							
	CATEGORY	L	T	P	C			
	PE	3	0	0	3			
COURSE OBJECTIVES								
1	To comprehend the materials that has been implicated in various forms of solar energy sources and its storages							
2	To educate the structure-property relationship and appreciate novel developments in the materials							
3	To explain the concept and the diverse materials used for solar devices							
4	To explicate in depth knowledge of about solar cells , thermal energy storage and electrical energy storages							
5	To gather idea of system balance and analysis with reference to its cost							
UNIT I MATERIALS FOR SOLAR COLLECTORS								
		9	0	0	9			
Collector Materials for Low, Medium and High Temperature Applications-Glazing Materials, Optical Materials – Absorber Coatings, Insulations, Use of Plastics –Reliability and Durability of Solar Collectors – Environmental Degradation of Low-Cost Solar Collectors								
UNIT II MATERIALS FOR SOALR CELLS								
		9	0	0	9			
Crystalline Structure – Fundamental Principles of Energy Bands–Types of Semiconductors – Doping and influence of impurities on energy levels —Structure of Silicon solar cell–Fabrication and Optimization of solar cells– Amorphous silicon solar cells								
UNIT III NOVEL AND THIN FILM SOLAR CELLS								
		9	0	0	9			
Cadmium Telluride, Galium-Arsenic, GaInP/GaAs/Ge-ThinFilm, Single Crystalline, Polycrystalline Materials - Multi Junction and Tandem Junction Solar Cells – Conversion Efficiency of Solar Cells–Organic solar cells.								
UNIT IV ENERGY STORAGE MATERIALS								
		9	0	0	9			
Thermal Storage Concepts -Materials for Sensible and Latent Heat Energy Storage. Chemical storage Concepts – Rechargeable Batteries–Types, Operating range, Comparison and suitability for various applications-Super Capacitors.								
UNIT V MATERIALS AND COST ANALYSIS								
		9	0	0	9			
Functional requirements of other materials for components like Invertors, Charge Controllers, Wires, Pipes, Valves, etc. and identification of suitable materials-Simple Cost Analysis for alternative selection of materials-Case studies.								
TOTAL(45L) : 45 PERIODS								
REFERENCE BOOKS:								
1	Ibrahim Dincer and Marc A Rosan, Thermal Energy Storage: Systems and Applications, JohnWiley,2003.							
2	Sukhatme and Nayak, Solar Energy: Principles Of Thermal Collection & Storage, Tata McGrawHill,2008							
3	Nelson,J, The Physics of Solar Cells, Imperial College Press, 2003							
4	Jef Poortmans and Vladimir Arkhipov, Thin Film Solar Cells, John Wiley and Sons,2008.							
5	Thomas Markvart, Solar Electricity, John Wiley and Sons,2007							

COURSE OUTCOMES: Upon completion of this course, the students will be able to:		Bloom Taxonomy Mapped
C01	Describe the fundamental principles of materials best suited for making solar collectors, their reliability, characteristics and possibility of using plastics.	Understand
C02	Explore the materials for solar cells, principles, doping and fabrication and optimizations of solar cells.	Analyze
C03	Explore the novel materials for the fabrication of solar cell, their efficiency and organic solarcells.	Analyze
C04	Explain the concept and the diverse materials used for solar energy devices for diverse applications.	Understand
C05	Describe the requirements of system balance and analysis with reference to its cost.	Understand

COURSE ARTICULATION MATRIX

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	0	0	0	0	1	0	0	0	0	1	1	1
CO2	3	2	1	0	0	0	1	0	0	0	0	0	1	1	2
CO3	2	3	0	0	1	0	0	0	0	0	0	0	2	2	2
CO4	2	1	0	0	2	1	0	0	1	0	0	0	1	1	1
CO5	3	2	0	1	0	0	1	0	0	0	0	1	1	1	2
Avg	2.6	2	1	1	1.5	1	1	1	1	0	0	1	1.2	1.2	1.6

3/2/1 – indicates strength of correlation (3 – high, 2- medium, 1- low)

22MEHO108	DESIGN OF SOLAR AND WIND SYSTEMS	
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