Master of Science – Materials Science

(M.Sc.)(Materials Science) Semester –II

Course Code	PS02EMTS52	Title of the Course	Solar Energy
Total Credits of the Course	4	Hours per Week	4 hrs

Course Objectives:	1. Renewable energy Solar cell and used in semiconductor devices 2. Optical absorption processes 3. Advantages of thin film solar cells and limitations

Course Content		
Unit	Description	Weightage* (%)
1.	The nature of solar energy, terrestrial solar radiation, solar constant, air mass, solar energy conversion types and devices.	25%
2.	Band pictures of solids, metals, semiconductors and insulators, intrinsic and extrinsic semiconductors, charges carriers in semiconductors. Semiconductor p-n junction, potential barrier and barrier height, photovoltaic conversion, photovoltaic solar cells, p-n junction solar cells, photo electro chemical solar cells.	25%
3.	Optical absorption processes, direct inter-bandoptical transitions, indirect inter-band transitions, optoeletronic processes, generation and recombination phenomena.	25%
4.	Construction and theory of p-n junction solar cells, important parameters of solar cell, factors affecting cell efficiency, heterojunction, heterojunction solar cells, examples of heterojunction solar cells, fabrication and advantages. Thin film deposition methods and materials, anti-reflection coatings, advantages and disadvantages of thin film solar cells, optical concentration.	25%

Teaching-Learning Methodology	Group discussion/ Panel/Presentation

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Students will learn about renewable energiesespecially solar cells and their applications in different areas.
2.	Also helpful for higher studies, research area and industries
3.	

Suggested References:	
Sr. No.	References
1.	Photoelectochemical Solar Cells by Suresh Chandra
2.	Solar Energy by S. P. Sukhatme
3.	Physics of Semiconductor DevicesbyS. M. Sze

On-line resources to be used if available as reference material
On-line Resources

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