

## PHY7204: SOLAR THERMAL CONVERSION

**1. Course Name:** Solar Energy

**2. Course Code:** PHY7204

**3. Credit Units:** 3

**4. Course Description:**

This course discusses renewable energy sources and solar energy.

**5. Course Objectives:**

At the end of the course, the students should be able to:

- Discuss limitations of renewable energy sources.
- Give the relationship between photosynthesis and energy production.
- Carry out thin-film deposition.
- Characterize solar cells.

**6. Course Outline:**

Content	Hours
Introduction to renewable energy sources (biomass, wind energy, ocean current energy) and limitations.	7
Renewable energy conversion pathways, solar spectra- natural radiation, some goals of material science for solar energy conversion systems.	7
Photosynthesis- its relation to energy production.	5
Thin film technology- Deposition of thin films, methods of thin film deposition.	5
Solar thermal- Solar collector surfaces, selectively solar absorbing surfaces.	5
Energy conservation and thermal properties, models for microstructure and thermal & optical properties, degradation and durability (accelerated ageing tests, modeling of optical properties during ageing, lifetime	6

evaluations, degradation kinetics of solar absorber coatings).	
Solar Cells and solar cell types- Photoelectric, Photovoltaics, Photoelectrochemical solar cells (principles, characterizing and analyzing solar cells, types and kinds of each type),	7
Installation and care of PV systems	5
Total	<b>45</b>

### **7. Mode of Delivery :**

This course will consist of lecture sessions and there will also be data analysis using theories learnt.

## **8. References:**

1. John Twidell and Tony Weir. Renewable Energy Resources. Taylor & Francis Gp (1986) (Textbook)
2. John A. Duffie and William A. Beckman. Solar Engineering of Thermal Processes. John Wiley & Sons.
3. William B. Stine. Solar Energy Fundamentals and Design with Computer Applications. John Wiley & Sons.