

EN671 Solar Energy Conversion Technology (3-0-0-6)

Course Content:

Solar radiation: Extra-terrestrial and terrestrial radiation, radiation measurements; Earth-Sun relation: Solar angles, day length, angle of incidence on tilted surface; Sun path diagrams; Shadow determination; Extraterrestrial characteristics; Effect of earth atmosphere; Measurement and estimation on horizontal and tilted surfaces; Indian solar radiation data.

Solar thermal conversion: Fundamentals, Flat plate collectors-liquid and air type, Theory of flat plate collectors, selective coatings, advanced collectors, solar water heaters, solar air heaters, solar cooker, solar dryers, solar stills, solar pond, solar cooling and refrigeration.

Thermal storage; Passive and active conditioning of buildings; Conversion of heat into mechanical energy; Solar thermal power generation.

Solar Photovoltaics: Principle of photovoltaic conversion, fabrication of photovoltaic devices, PV system applications (water pumping etc.), PV power plant, PV system design and economics, new generation solar cells and emerging technologies.

Solar Photocatalysis: Mechanism; Kinetics; Performance parameters; Applications. Recent advances in solar energy technologies.

Texts/References:

1. G. N. Tiwari, *Solar Energy, Fundamentals, Design, Modeling and Applications*, Narosa, 2002.
2. S. P. Sukhatme and J. K. Nayak, *Solar Energy: Principles of Thermal Collection and Storage*, Tata McGraw Hill, 2006.
3. C. S. Solanki, *Solar Photovoltaics: Fundamentals, Technologies and Applications*, Prentice Hall India, 2nd Edition, 2011.
4. J. A. Duffie and W. A. Beckman, *Solar Engineering of Thermal Processes*, John Wiley, 2006.
5. D. Y. Goswami, F. Kreith and J. F. Kreider, *Principles of Solar Engineering*, Taylor and Francis, 1999.
6. H. P. Garg and J. Prakash, *Solar Energy: Fundamentals and Applications*, Tata McGraw Hill, 1997.
7. M. A. Green, *Third Generation Photovoltaics: Advanced Solar Energy Conversion*, Springer, 2003.
8. A. Goetzberger and V. U. Hoffmann, *Photovoltaic Solar Energy Generation*, Springer- -verlag, 2010.