Certificate Course on Solar Energy Convertors (SECs)

Course Preamble

Given the growing demand for skilled professionals in solar power generation, and the rapid changes in solar energy converting technology, there is an increasing demand for the skill manpower in maintenance of Solar Energy Convertors (SECs) in India and abroad. The course has been designed to meet this requirement. This certificate course is designed with a proper balance of theory and practical, so that students get enough hands on experience. The project work at the end of the course enables students to get an exposure to industrial standards.

Course Objective

This skill oriented course in the study of solar photovoltaic (PV) cells, solar water heater, solar cookers, etc., will give students the book knowledge and hands on experience needed to become entrepreneur/ self-employed. Emerging renewable energy sector expected to create millions of jobs in making an exciting career and opportunity for students. Individuals can benefit by investing in Green Energy stocks and funds. These are already doing well and investing in alternative energy could see even higher growth in the coming years. Individuals can also consider shifting their careers to the alternative energy segment, which can provide them excellent future career prospects. The alternative energy domain presents entrepreneurs with tremendous opportunities to invest in a small, medium or large scale.

Course Overview

This, 50 Hours spanned over 6 months, training course has been specifically designed to address the requirements of Solar Energy Convertors (SECs). Participants will learn different types of Solar Energy Convertors (SECs) in different modules.

Course Structure

Theory	20 Hours
Practical	18 Hours
Project	12 Hours

Course Contents

Theory

Introduction to renewable energy (4 Hrs)

Renewable and non-renewable energy sources, heat and light from the sun, basics of solar radiation, solar constant, wind energy, water at high places, ocean, biomass, nuclear power, geothermal energy,

Fundamentals of solar photovoltaic and Solar Thermal applications (10 Hrs)

Fundamentals of solar cells: semiconducting materials, absorption of radiation by semiconductors, band gap theory. Solar cookers, different types of cookers- flat plate and box type solar cooker, advantages of solar cookers, limitations, solar dryers, solar stills, solar air heater, solar pond, desalination, solar furnaces, solar water heaters.

Introduction of Photovoltaic Technology and its applications (6 Hrs)

Solar Cells to Module, Module name plate specifications, Module to Array and Basic Structure of PV module. Factors affecting output of a PV module - (Temperature, Irradiance, Tilt angle, cell area shadowing, dust mismatch, PV module configurations, MPPT operation etc). Applications of PV, different configurations of PV power system: Stand along, Grid, Hybrid system etc.

Practical (18 hrs) : (A minimum of four experiments should be done.)

1. Determination of thermal efficiency of a flat plate solar collector

2. Determination of time constant of a flat plate solar collector

3. Determination of solar cell characteristics.

4. Determination of top heat loss factor of a box type solar cooker.

5. Performance evaluation of a single basin solar still.

6. To study the time variation of water temperature in a built-in-storage solar water heater.

Project work (12 hrs) : All students shall do a project individually or as a group. Viva on this project will be conducted.

Examinations : Evaluation shall contain internal and external assessments.

External Evaluation

Theory: **-** 40 marks

Practical: **-** 25 marks

Project work and Viva-voce: 20 marks

Internal Evaluation

Theory: 10 marks	**Practical: 5 marks**
Attendance: 2 marks	Attendance: 1 mark
Assignment: 2 marks	Lab involvement: 2 marks
Seminar/viva: 2 marks	Record: 2 marks

Best of two test papers: 4 marks

Eligibility

10+2, Diploma, Any Graduate

Certificate

Upon the completion of this course, Department of Physics will provide Course certificate. 75 % attendance is compulsory.

Suggested Readings

1. Chenming, H. and White, R.M., Solar Cells from B to Advanced Systems, McGraw Hill Book Co, 1983
2. Ruschenbach, HS, Solar Cell Array Design Hand Varmostrand, Reinhold, NY, 1980
3. Proceedings of IEEE Photovoltaics Specialists Conferences, Solar Energy Journal.