Five-day ISTE Workshop for Coordinators
on
Solar Photovoltaics: Fundamentals, Technologies and Applications
(11th April – 15th April 2011)
under the
National Center for Photovoltaic Research and Education (NCPRE)
and
National Mission on Education through ICT (MHRD)
Conducted by IIT Bombay

Introduction

JNNSM:
The **'Jawaharlal Nehru National Solar Mission'** is one of the most important technological-cum-societal initiatives announced by the government in recent years. It has the potential of simultaneously increasing the awareness and use of clean energy, creating job opportunities, transforming life in rural areas, and also kick-starting a major new industry segment. The success of JNNSM requires availability of a large number of trained engineers and scientists in the solar energy area. The 'National Centre for Photovoltaic Research and Education' (NCPRE), set up at IIT Bombay in October 2010, will be a major national resource in the photovoltaics (PV) area, for both research and education.

MHRD Project on Teacher Empowerment:
An important initiative has been taken by IIT Bombay as part of the National Mission on Education through ICT (NMEICT,) to work with Engineering Colleges in the country to enhance the teaching skills of our faculty colleagues in core Engineering and Science Subjects. Under this project called 'Empowerment of Students and Teachers through Synchronous and Asynchronous Instruction,' IIT Bombay conducts two-week ISTE workshops at various remote centers across the country, during the vacation periods in summer and winter. These workshops are conducted in distance mode, through the AVIEW software using internet, for live transmission.

The NMEICT, supported by MHRD, together with NCPRE supported by MNRE, are proposing to organize a teacher training program on **'Solar Photovoltaics: Fundamentals, Technologies and Applications.'**

The methodology for conducting the workshops is as follows: We invite faculty from various remote centers to a five-day Coordinators' training workshop which is held in IIT, at least two months before the main workshop. These Coordinators then act as Workshop Coordinators during the main workshop, liaising between the participants at their Remote Centers, and IIT Bombay, from where the workshop is transmitted live. During the main workshop, the participating teachers attend live lectures given by IIT faculty, at a remote center close to their own college, and also attend tutorial and lab sessions conducted in the same centers. The Workshop Coordinator at every center supervises the conduct of tutorials and Labs. All the lectures and tutorial sessions are recorded. The final edited audio-visual contents, along with other course material will be released under Open Source. These contents can be freely used later by all teachers and students.

In the past, IIT Bombay has conducted two-week ISTE workshops twice on 'Effective teaching/ learning of Computer Programming' in December 2009 and in June-July 2010. These workshops were conducted for over 1300 participating teachers across the country, at 36 remote centers. IIT Bombay also conducted a two-week ISTE workshop on 'Database Management Systems' from 13th to 23rd Dec. 2010, for over 1000 teacher participants at 32 remote centers.

The success of these earlier workshops has now led us to announce more such two-week ISTE workshops. In addition to the already announced workshops on 'Thermodynamics in Mechanical Engineering' and 'Basic Electronics,' an important workshop in this series is on '**Solar Photovoltaics: Fundamentals, Technologies and Applications,'** to be held in December 2011.

Five-day ISTE Coordinators' Workshop

The **five-day ISTE Coordinators' Workshop** for **'Solar Photovoltaics: Fundamentals, Technologies and Applications'** is being conducted from **11th to 15th April 2011** to provide a complete orientation to the prospective Workshop Coordinators, on the methodology to be followed in this project. This will include the delivery of live lectures through the AVIEW mechanism of interaction with participants, and the local conduct of tutorials and labs. Since the final contents are meant to be adopted by most colleges across the country, this workshop will finalize the following for the subject of 'Solar Photovoltaics: Fundamentals, Technologies and Applications'

(a) Definition of common syllabus to be covered.
(b) Graded coverage from simple to difficult levels for each topic and subtopic.
(c) Nature of tutorials, keeping the above gradation and the typical examination pattern in mind, but leading to the typical advanced levels reached in teaching of such subject at the top institutions of the world.
(d) Discussion of laboratory environment and the experiments to be conducted, if any.
(e) Use of the learning management system, audio-visual equipment, editing tools.
(f) Other logistic details for conducting the main workshop.

Tentative syllabus, as followed in IIT Bombay for a first course in 'Solar Photovoltaics: Fundamentals, Technologies and Applications,' is given below:

Course contents

Part 1: Solar PV fundamentals and technologies (about 20 hours)

Introduction to semiconductor Physics, theory of P-N junction, operation of P-N junction as solar cells, parameters of solar cells, design of solar cells, solar cell materials and technologies, fabrication of crystalline Si solar cells, solar PV modules, PV module output as function of temperature and solar radiation.

Part 2: Applications of solar PV technologies (about 20 hours)

Introduction to power electronics devices, off-grid and grid-connected PV systems, components of solar PV systems, charge controller, DC-DC converter, DC-AC inverter, maximum power point tracking, energy

storage options for solar PV systems, availability of solar radiation at a given location, design of off-grid PV systems, design of grid-connected PV systems, Life cycle cost analysis.

Duration and Venue

The duration of the workshop is five days. It will start at 9 am on Monday 11th April 2011 and end at 5.30 pm on Friday 15th April 2011.

Venue: Seminar Hall, Van Vihar Guest House, IIT Bombay.

Teaching Faculty

Prof. Chetan S. Solanki, Department of Energy Science and Engineering, IIT Bombay, http://www.ese.iitb.ac.in/~chetan/index.htm
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 Prof. B.G. Fernandes, Department of Electrical Engineering, IIT Bombay, http://www.ee.iitb.ac.in/wiki/faculty/bgf
Email: bgf@ee.iitb.ac.in and other faculty from IIT Bombay.

Who Should Attend
The workshop will benefit faculty colleagues who are willing to be prospective **Workshop coordinators** for the larger main workshop to be held in **December 2011**. It is mandatory that the participant's institute should be running or planning to run energy-related course(s). The participants must have education in either electrical, electronics, or mechanical engineering as prior background for the course.

It is also mandatory that the participant's Institute is well equipped to conduct the workshop through the internet for a minimum of 30 participants.

Note
This workshop is conducted under the 'eOutreach project' of IIT Bombay. Live recording of the course and other created contents will be released under Open Source, through a portal. The recorded CD/DVD of the course lectures will be available for distribution at cost, to any individual or institution. All participants are required to sign an undertaking for such release of contents contributed by them during and after the workshop. Recognition and citation will naturally be made for all contributors.

Course Fee
Since the workshop is partially funded by **National Center for Photovoltaic Research and Education (NCPRE),** and partially by the **National Mission on Education through ICT (MHRD**, **Government of India)**, there is **no** course fee for participation.
(Travel fare reimbursement will be made for up to A/C 2-tier or lowest return airfare, as per GOI entitlement.)

Accommodation

Shared Guest House accommodation with standard boarding will be provided free to the participants, depending on availability, from the evening of Sunday 10th April 2011 (arrival) to the morning of Saturday 15th April 2011 (departure.)

How to Apply

Those wishing to attend this course should register on line at http://ekalavya.it.iitb.ac.in/

Due to limited seats, registration will be on a first-come-first-served basis. Confirmation of registration will be sent by email. **Enrollment will be strictly on line.**

Last Date for Online Registration: **5th April 2011.**

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