

**MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE**  
**(UGC - AUTONOMOUS)**

**Report on**

**A Five-day Online Faculty Development Programme**

**" Solar Photovoltaic Systems: Fundamentals and Challenges "**

**Organized by Dept of EEE - MITS**

**20th - 24th July 2020**



**Report Submitted by: Dr M. Chakkarapani, Assoc Professors, Dept of EEE, MITS**

The Department of Electrical and Electronics Engineering (EEE) organized a Five-day Online Faculty Development Programme on "Solar Photovoltaic Systems: Fundamentals and Challenges" during 20<sup>th</sup> – 24<sup>th</sup> July 2020 through Microsoft Teams. The objectives of this FDP were to bring the academicians and researchers from different academic levels together in a common platform and to address the various issues in PV systems like partial shading, PV array faults, Maximum Power Point operation and control aspects of grid/residential grid/microgrid. The experts were eminent academician and research scientist from reputed Universities in India, abroad and R& D institute in India which includes faculties from NIT Tiruchirappalli, NIT Silchar, National University of Singapore, Singapore and National

Institute of Solar Energy, Gurgaon. There were 31 delegates participated in this FDP out of which 27 Faculty members, 03 PhD research scholars and 01 PG students.

- **In Session 1 and 2:** Dr. G. Saravana Ilango, NIT, Tiruchirappalli, discussed about importance of the Solar Photovoltaic (PV) systems and Modelling of PV cell and Module; and later in detail about series and parallel operation of PV modules.
- **In Session 3 and 4:** Dr. G. Saravana Ilango, NIT, Tiruchirappalli, given guidelines to develop Simulink model for PV cells and modules; and later he demonstrated simulation study on PV Output Power with respect change in irradiance and temperature based on the developed model.
- **In Session 5,6 and 7:** Dr. G. Saravana Ilango, NIT, Tiruchirappalli discussed about the Need for MPPT, MPPT Algorithms, implementation of MPPT algorithms using DC-DC converters, effect of partial shading on PV output, Interconnection Schemes for Mitigating the Partial Shading Effect.
- **In Session 8:** Guru Raghav Raman, National University of Singapore, discussed about how to apply any kind of optimization Algorithms for MPPT Implementation.
- **In Session 9:** Dr. M. Chakkarapani, MITS, Madanapalle, discussed about how to identify occurrence of partial shading in PV string with measurement of MPP voltage and current alone.
- **In Session 10:** Dr. G. Saravana Ilango, NIT, Tiruchirappalli, discussed two different method in detail to extract unknown PV module parameters.
- **In Session 11:** Dr. M. Chakkarapani, MITS, Madanapalle discussed about challenges involved in detecting the PV array faults compared to conventional power systems faults.
- **In Session 12:** Birinchi Bora, National Institute of Solar Energy, Gurgaon discussed different to identify PV module degradation and reliability of PV modules.
- **In Session 13 and 14:** Dr. M. A. Asha Rani, NIT, Silchar discussed about Grid Synchronization and Control of Grid-Connected PV Inverter under balanced and unbalanced grid conditions.
- **In Session 15:** Guru Raghav Raman, National University of Singapore, Singapore discussed about power management strategy for residential microgrids.
- **In Session 16:** Guru Praanesh, National University of Singapore, Singapore discussed about control strategy of Islanded Microgrids with Inverter-Based Generation.
- **In Session 17:** Interactive Session with Resource Persons

Overall, the five day programme enriched the participants by providing a flavour in their research front with fundamentals, latest findings, practical challenges and possible

solutions pertaining to modeling and control of grid connected PV systems under uniform and partial shading conditions, PV module testing, design considerations for PLLs for grid synchronization, control of microgrids and renewable integration of residential microgrid.