Tel No:+97126654546 | Fax No:+97126654182 | Email: training@cmc-me.com | www.cmc-me.com

EE262:
Solar Power System Theory and Maintenance

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Training Description:

This comprehensive training course is designed to provide participants with both theoretical knowledge and practical skills in solar photovoltaic (PV) systems. It covers the principles of solar power generation, system components, design considerations, performance optimization, safety protocols, troubleshooting, and preventive maintenance. Through a blend of classroom instruction, case studies, and hands-on demonstrations, participants will gain the expertise to install, operate, maintain, and troubleshoot solar power systems effectively, ensuring optimal performance and reliability.

Training Objectives:

By the end of the training, participants will be able to:

- ✓ Understand the fundamentals of solar power generation and photovoltaic technology
- ✓ Identify and describe the function of each solar PV system component
- ✓ Design basic solar PV systems based on load requirements and environmental conditions
- ✓ Apply proper installation and wiring practices in compliance with standards
- ✓ Conduct system inspections, testing, and performance evaluations
- ✓ Troubleshoot common faults in solar power systems
- ✓ Implement preventive and corrective maintenance strategies
- ✓ Apply safety practices during installation and maintenance activities

Training Designed for:

This training course is intended for Electrical engineers and technicians, Renewable energy engineers and consultants, Facility managers and maintenance personnel, Project managers in renewable energy projects, Solar PV installers and contractors, Technical trainers in solar energy and Anyone interested in solar power system installation, operation, and maintenance.

Training Requirement:

"Hand's on practical sessions, equipment and software will be applied during the course if required and as per the client's request."

Contents can be adapted to your specific wishes. It is therefore possible to focus on specific modules of the training course as per client's learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.

Training Program:

DAY ONE:

- ❖ Fundamentals of Solar Power Systems
  - Introduction to Renewable Energy and Solar Power
    - Global energy trends and role of solar energy
    - Types of solar energy technologies (PV, CSP, thermal)
  - Basic Principles of Photovoltaics
    - Solar radiation and energy conversion
    - Photovoltaic effect and solar cell operation
  - Types of PV Modules and Technologies

- Monocrystalline, polycrystalline, thin-film modules
- Efficiency, lifespan, and performance comparison

- Solar Resource Assessment
  - Measuring solar irradiance
  - Tools and software for resource estimation

DAY TWO:

❖ PV System Components and Configurations

- System Configurations
  - Off-grid, grid-tied, and hybrid systems
  - Applications and selection criteria
- PV Modules – construction, rating, and testing
- Inverters and Power Conditioning Units
  - Types, functions, and efficiency considerations
- Energy Storage Systems
  - Battery types (lead-acid, lithium-ion, flow batteries)
  - Battery sizing and management
- Balance of System (BOS) Components
  - Mounting structures, wiring, connectors, combiner boxes, charge controllers
- Design Considerations
  - Load calculation, site assessment, shading analysis

DAY THREE:

❖ Installation Practices and Safety

- Site Preparation and Mounting Techniques
  - Roof-mounted vs. ground-mounted systems
  - Tilt angles and orientation for maximum output
- Electrical Wiring and Connection
  - String configuration, series/parallel connections
  - Cable sizing and protection devices
- Standards and Codes
  - IEC, NEC, and local regulations for PV systems
- Safety in Solar PV Installation and Maintenance
  - Electrical safety, fall protection, PPE usage
  - Lockout-tagout (LOTO) procedures

DAY FOUR:

❖ Operation, Performance Monitoring, and Troubleshooting

- Performance Monitoring Tools and Techniques
  - I-V curve tracers, data loggers, SCADA systems
- System Testing and Commissioning
  - Continuity checks, insulation resistance tests
- Common Issues in PV Systems
  - Soiling, shading, hotspot formation, inverter faults, battery failures
- Troubleshooting Methodologies
  - Fault identification and root cause analysis
  - Practical case studies of real-world PV faults

DAY FIVE:

- Preventive & Corrective Maintenance and Case Studies
  - Preventive Maintenance Procedures
    - Cleaning, inspection schedules, tightening connections
    - Firmware and software updates for inverters and monitoring systems
  - Corrective Maintenance
    - Replacing damaged modules, cables, inverters, batteries
  - System Upgrades and Life Extension
    - Retrofitting and integrating new technologies
  - Case Studies & Best Practices
    - Analysis of successful PV projects and lessons learned
  - Final Assessment & Group Activity
    - Hands-on maintenance exercise or troubleshooting simulation
    - Review of key concepts and Q&A
- POST-ASSESSMENT and EVALUATION

Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Gamification, Software & General Discussions
- Pre and Post Test

Training Certificate(s):

CMCT Internationally recognized certificate(s) will be issued to each participant who completed the course.

Training Fees:

TBA as per the course location - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01st of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

Training Timings:

Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:00	Recess (Prayer Break & Lunch)
13:00 - 14:00	Last Session

For training registrations or in-house enquiries, please contact:

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