

COURSES MODULE

For

SOLAR POWER PLANT DESIGN ENGINEERING



Course Outline

- ❖ Introduction to Solar Power Plant /Solar Radiation
- ❖ Series and parallel circuit
- ❖ PV Cells selection and sizing
- ❖ Inverters selection and sizing
- ❖ Module mounting system
- ❖ Plant Installation and commissioning
- ❖ Matching Array and Inverter sizing
- ❖ Balance of system and protection
- ❖ Cable Sizing and Energy Efficiency and calculation
- ❖ System losses of solar power plant
- ❖ Solar power plant site survey and assessment
- ❖ Yield performance/ maintenance and troubleshooting
- ❖ Megawatt solar power plant system
- ❖ Smart Grid/net metering
- ❖ Costing and Tendering of solar power plant

Solar PowerPlant Design &Detail Engineering

Introduction to Solar Power plant

Solar Radiation

Irradiance
Irradiation & peak Sun Hours
Solar Radiation data
Sun Path Diagram
Solar altitude
Geometric Effects
Tilting Solar Modules
Magnetic North & True North

Series & Parallel circuit

Series circuit
Parallel circuit
Combining series & Parallel circuit
Understanding cell connection
Arrays

PV Cells Selection and Sizing

Introduction
Power characteristics of solar cell
Fill factor & equivalent solar cell circuit
STC & NOCT Condition
Factors which affect the performance of solar cells
Module Reliability
Manufacture of Silicon Solar Cells
Commercial Modules v Electrical Protection

Inverters Selection and Sizing

Purpose of inverters
Grid connected inverters vs stand-alone inverters
Types of inverters-PV to inverter interface
Inverter protection system
Power quality
Monitoring
Inverter efficiency
Isolated Inverters
Inverter Products For Use In India

Module Mounting Systems

Introduction
Roof mounted system
Calculating the Wind Loading of the Solar Array
PV array row spacing
Ground mounted system

Plant Installation And Commissioning

IEC Standards
Equipment Selection-Warranties
Installation Preparation
Equipment Installation
Monitoring Equipment
Commissioning
System Documentation
System Installation & Pre-Commissioning Checklist
Commissioning Test Sheets

Balance of system

Introduction & Cabling
Array string protection & disconnect switches
Lightning protection
Array junction box
PV Main disconnection devices
Metering
System Monitoring: Local and/or Web Based Display

Matching Array & Inverter Sizing

Matching the pv array to the voltage specifications of an inverter
Matching the pv array to the inverter's current rating
Matching the PV array to the inverter's Power rating
Summary of calculation for matching array & inverter
Example

System protection

Determining the protection equipment & switching
PV Array maximum voltage
Circuit protection: Over current
System earthing (DC & AC)
Connecting the system to the grid
Disconnection Devices

Cable sizing

Determining the size of the DC & AC Cables
Voltage drop calculation

System Losses of Solar Power Plant

Determining the Size of the DC and AC Cables
Losses in a Grid-Connected PV System

Energy Efficiency and Calculation

Introduction
Energy Efficiency Measures
Overview of Passive Solar Design Principles

Solar power Plant Site Survey & Assessment

Introduction
Undertaking a Site Assessment
Choosing a PV Module
Choosing an Inverter
Choosing a Mounting System Type
Determining the Maximum Number of Modules That Can Fit on a Roof

Yield Performance(Energy Guarantee)

What Determines the Energy of a System
Calculating the Energy Yield for a PV Grid-Connected System
Specific Yield
Performance Ratio
CUF Calculation

Megawatt Solar Plant System

Introduction
Preliminary Planning
Designing a Large PV Grid Connect System
What Array/Inverter Configuration Should Be Selected?
Monitoring

Costing and Tendering Of Solar Power Plant

Introduction
Simple Payback
Life Cycle Costing
Determining Costs Associated with the Whole PV System
Valuing a PV System

Maintenance And Troubleshooting

System Maintenance
Troubleshooting

Smart Grid/Net Metering

Smart Grid
Smart Meters
PVsyst, meteonorm, Google sketchup

Software's

Google sketch up
PV Syst

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