



Course Name	:	Solar Power & Photovoltaic System
Course Code	:	RE01
Course Objective		
Students learn how solar panel works on different conditions and the functions of components used to generate power from solar panel.		
Duration of course = 20 hrs.		
Lecture/Lab wise breakup		Number of hours
1.	<p>Introduction to Solar power: Discussion of Fundamentals</p> <p>The Diode: Description of diode, Operation Principle of Diode, E-I characteristic of diode, Forward- Biased Diode, Reverse- Biased Diode.</p> <p>Solar panel: photovoltaic cell, Module and Panel, E-I characteristic of PV cell, electric power output, irradiance, Standard Test Conditions and Efficiency.</p>	7
2.	<p>Effect of Temperature on Solar Panel Performance:</p> <p>Effect of Temperature on the output voltage, current and Power of PV Panel, Open Circuit Voltage and Short Circuit Current of PV Module Operating at high temperature, Maximum Power Point produced by a Single PV Module at high temperature.</p> <p>Storing Energy from Solar Panels into Batteries:</p> <p>Energy Storage, Lead-acid batteries, Battery charge using a PV Module, Open circuit voltage and short circuit current of 36 cell PV Module, Operation of the circuit with a blocking diode when the PV module in the dark and illuminated,</p>	10
3.	<p>Effect of shading on Solar Panel Orientation: Effect of Partial shading on PV Panel Operation, Bypass diode to mitigate the effect of Shading on PV module connected in Series, blocking diode to mitigate the effect of Shading on PV module connected in Parallel, No shade Operation, Operation with one Shaded cell.</p>	3
Course Outcome		
<ul style="list-style-type: none"> Students learn how solar panel works on different conditions and the functions of components used to generate power from solar panel. 		

Course Content for Renewable Energy Lab

Course Name	:	Wind Power Generation System
Course Code	:	RE02
Course Objective		
Students learn how power generate from wind source , working of turbine on different conditions and functions of equipment used in wind power.		
Duration of course = 20		
Lecture/Lab wise breakup		Number of hours
1.	<p>Introduction to Wind power: Discussion of Fundamentals, Wind turbine classification, HAWT, VAWT, Small scale wind power.</p> <p>Voltage – Speed characteristic of Wind Turbine: Construction, Operation, Wind Turbine generator voltage and frequency as a function the rotation speed.</p> <p>Torque-Current characteristic of Wind Turbine: Torque, Force produced by interacting magnetic fields, electromagnet, generator winding, Plotting torque – current curve of the wind turbine generator.</p>	10
2.	<p>Power – wind speed:</p> <p>Air density, Kinetic energy in the wind, calculating wind power, relationship between wind power and wind speed, conversion of wind power into rotational mechanical power and electrical power, torque-speed curve, current-voltage and power-speed curve, wind turbine generator efficiency.</p> <p>Storing Energy from wind turbines into Batteries:</p> <p>Energy Storage, Lead-acid batteries, protection against battery overcharging and wind turbine over speeding, maximum charge voltage of the wind turbine controller, plotting the electrical power- wind speed curve of the wind turbine controller, battery overcharging protection</p>	10
Course Outcome		
<ul style="list-style-type: none"> Students learn how power generate from wind source, working of turbine on different conditions and functions of equipment used in wind power. 		