

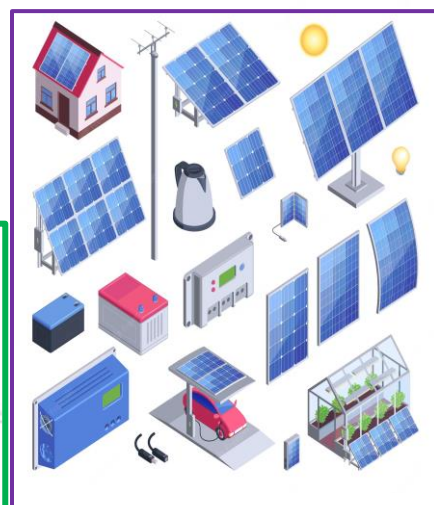
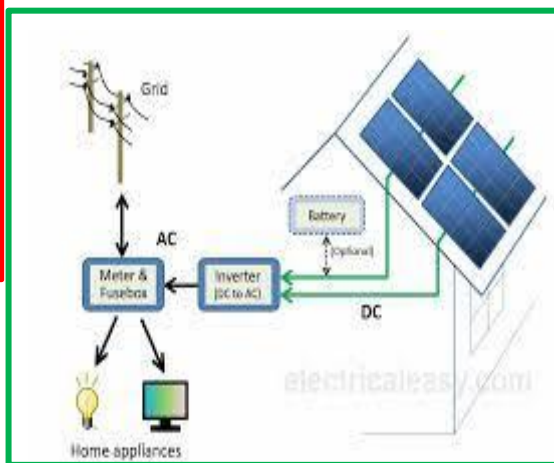
# VALUE ADDED COURSE

## CHEVA03 - Renewable Energy

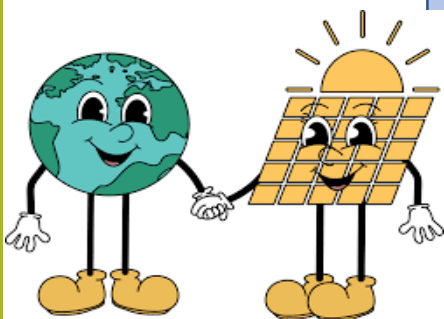
*Course Duration : 30 Hours*

*Session: September to October 2021*

Objectives: To know about 1.Introduction to Renewable and Solar Energy 2.Introduction of Photovoltaic Technology and its applications 3.Components of a PV System; Battery, inverter and Charge controllers 4.Fundamentals of PV system sizing 5.Troubleshooting of Batteries, Inverters and Charge controllers



Outcomes: The students would be able understand the various factors responsible for Recognize the importance of renewable energy, learn about the analytical techniques to understand the photovoltaic cell. fabrications and testing processes and mechanisms and explain solar energy conversion



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CourseCode:CHEVA03	RenewableEnergy	Hours:30
<b>Objectives</b>	Themajorobjectivesofthiscoursearetounderstandtheconcepts of: <ul style="list-style-type: none"> <li>➤ RenewableandSolarEnergywillbeappliedtounderstandingthebasicintroductions.</li> <li>➤ CoversthefundamentalprinciplesandPhotovoltaicTechnologyanditsapplications.</li> <li>➤ Thisunit coverstheComponentsofaPVSsystem;Battery,inverterandCharge controllers.</li> <li>➤ FamiliaritywithbasicconceptsinFundamentalsofPVsystemsizing.</li> <li>➤ AnoverviewofTroubleshootingofBatteries,InvertersandChargecontrollers.</li> </ul>	
<b>Unit-I</b>	<b>IntroductiontoRenewableandSolarEnergy:</b> RenewableEnergyanditsprospectsvarious RE sources, Introduction to Solar Energy and Solar Radiation, its importance, Differentiate SolarPV andSolarthermalEnergy,SolarResourceMeasurement, Instrumentationandits applications.	
<b>Unit-II</b>	<b>Introduction of Photovoltaic Technology and its applications:</b> Basics of Light to Energy Conversion, Brier History ofSolar / PVcells, Chemistry ofEnergyConversionin Solar Cell (Current and Voltage), Understanding basic terminologies of a PV cell (1-V Curve, Efficiency, FF), Solar Cells to Module, Module name plate specifications, Module to Array andBasicStructureofPV module.	
<b>Unit-III</b>	<b>Components of a PV System; Battery, inverter and Charge controllers:</b> Basics of standalone PV system, Balance of System (BOS), Introduction: Batteries, type of batteries, operationandstructure,BasicTerminologiesofaBattery,Charging&Discharging Characteristics.	
<b>Unit-IV</b>	<b>Fundamentals of PV system sizing:</b> What is sizing, significance and steps involved in sizing, Load Estimation, analysis and basics on energy efficiency, Site survey and assessment, Shadinganalysis,Customerprofiling andRole play,Inverter,Batter sizinganits aspects, Module sizing and aspects. Lay out diagrams, Spacing of PV strings and placing of eachcomponent.	
<b>UNIT-V</b>	<b>Troubleshooting of Batteries, Inverters and Charge controllers:</b> Quality assessment of the batteries inverters and charge controllers delivered at the site, Introduction to tools required for batter and inverter maintenance, Trouble shooting of Batteries, all types of batteries,Complaintsandservicing,Troubleshootingofinverters,Complaintsandservicing, TroubleshootingofCharges‘controllers:Complaintsandservicing.	
<b>Outcomes</b>	Thestudentwouldbeableto:- <ul style="list-style-type: none"> <li>➤ Recognizetheimportanceofrenewableenergy,Describeandunderstandthephotovoltaic cell.</li> <li>➤ Describethefundamentalchemicalandphysicalpropertiesthatdeterminesolarcell components.</li> <li>➤ Understandingtheuseofsolar freeenergiesaselectricalenergyconversion.</li> <li>➤ Describeandexplaincommonfabricationsandtestingprocessesandmechanismsand explainsolarenergyconversion.</li> </ul>	

**RecommendedBooks:**

1. StephenJ.Fonash.(2010).*SolarCellDevicePhysics*(2<sup>nd</sup>ed.).AcademicPressisan imprint of Elsevier, Kidlington, Oxford, OX5 1GB, UK.

2. Prof.Dr.-Ing.BernhardWeller,BernhardWeller,Claudia Hemmerle, SvenJakubetz, StefanUnnewehr,(2022)DETAILPHOTOVOLTAICSTechnology,Architecture, Installation, ISBN: 9783034603690.
3. Antonio Luque and Steven Hegedus, Handbook of Photovoltaic Science and Engineering,JohnWiley&SonsLtd,TheAtrium,SouthernGate,Chichester,West Sussex PO19 8SQ, England, ISBN 0-471-49196-9.
4. KeithJohnson,WindShear:GEWins,VestasLosesinWind-PowerMarketRace, Wall Street Journal, March 25th 2009, accessed on January 7th 2010.
5. CleanTechNation:Howthe U.S.CanLeadintheNewGlobalEconomy(2012)by Ron Pernick and Clint Wilder.