



INSTITUTE OF RETM LAB FACILITIES

RENEWABLE ENERGY LAB - NCMR BUILDING



Fig.1-Charge Controller System

1.CHARGE CONTROLLER SYSYTEM

- Charge controller system is a device is used to study the charge controlling techniques to charge the battery.
- When battery is charging using solar special techniques will be useful because of variable current source.
- With this device one can understand the efficiency of the charge controllers.

2. MEASUREMENT OF PV SYSTEM LOSSES

- A photovoltaic system or PV system is a power system, designed to supply solar power by means of photovoltaics.
- It consists of an arrangement of several components, including solar module to absorb and convert sunlight into electricity.

1. Halogen lamp
2. PV measurement unit
3. J type thermocouple
4. 20W panel
5. 10W panel
6. 5W panel
7. Solar panel meter



Fig.2-Measurement of PV System losses



Fig.3-Solar Based Single Phase Power Generation

3.SOLAR BASED SINGLE PHASE POWER GENERATION

- Solar based Single Phase Power Generation (VSSPG-01) Module is used to integrate solar energy resource for power generation.
- For this power generations following converter and inverter modules are used.
- We take look about it.

1. DC-DC buck-boost converter
2. Push Pull converter
3. Single phase H-bridge inverter



Fig.4-.Box type Solar Cooker

4.BOX TYPE SOLAR COOKER

- Box-type solar cookers consist of an insulated box, metallic cooking pots inside the box, double glass lid on the cooking tray, and a reflecting mirror fitted on the underside of the lid of the box.
- The cooking tray is insulated on the sides and bottom. The incoming solar radiation falls onto the double glass lid and passes through it to strike the blackened cooking pots and the cooking tray.
- The heat is absorbed by the blackened surface and gets transferred to the food inside the pots to facilitate cooking.
- The mirror reflector is set in such a way to reflect the solar radiation falling on it to the cooker box. Up to four black painted vessels are placed inside the box.
- The box type solar cooker takes 1½ to 2 hours to cook vegetables, rice, dals, cake etc

5.SOLAR VEGETABLE DRYER

- A solar dryer is another technology to harness the solar energy that is used to dry fruits, vegetables, and crops for preservation.
- Solar dryers are of two types: direct and indirect. In direct solar dryers, the substance that is to be dehydrated is exposed to the sunlight in a vast field.
- Indirect solar dryers consist of an insulated box coated inside with a black absorption surface, an air inlet and an air outlet, and a single- or double-glazed glass.
- A solar dryer works on the principle of the density differential. The inlet air hole is at the lower side for the entrance of the cold air and the outlet air is at the upper side of the opposite wall.



Fig.5-.Solar Vegetable Dryer

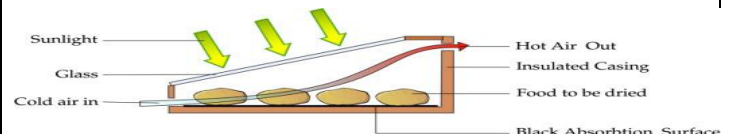


Fig.6-.Setup for dc-dc & dc-ac converter

6. SETUP FOR DC-DC & DC-AC CONVERTER

- A photovoltaic system or PV system is a power system designed to supply solar power by means of photovoltaic's.
- It consists of an arrangement of several components, including solar module to absorb and convert sunlight into electricity, a solar inverter to change the electric current from DC to AC.

ADVANCED RENEWABLE ENERGY LAB- MMTTC BUILDING

1. SOLAR SIMULATION SYSTEM

- Solar simulation system is used to measure the I-V characteristics of solar panel when change in the atmospheric conditions like intensity and temperature.
- In outdoor condition we cannot adjust the intensity and temperature of solar panel so in this simulation system there is intensity regulator to adjust the intensity falling on the solar panel, temperature controller to adjust the temperature of the solar panel.



Fig.1-.Solar Simulation System



Fig.2-.Thermal Storage System

2.THERMAL STORAGE SYSTEM

- In LHTS systems, a heat transfer fluid (HTF) transfers energy to or from the PCM.
- Melting of the PCM is initiated whenever the HTF temperature is above that of the fusion/melting temperature of the PCM.
- Energy storage takes place during the melting process which is referred to as a charging mode.
- In the discharging mode of operation, the HTF temperature is lower than that of the melting temperature of the PCM and initiates freezing.
- Thus one complete cycle in a LHTS system consists of energy charging and discharging modes during which the PCM undergoes alternate melting and freezing.
- The reliability of a LHTS unit depends highly on the number of cycles that the PCM can support without deterioration.

3.WIND ENERGY TRAINING SYSTEM

- Wind Energy Training System is a scaled down version of actual wind turbine power plant.
- This system facilitates us with working and configurable model of wind turbine.
- It gives the insight about individual components and consequences of changing the operating points of any wind turbine defined in terms of wind speed and pitch angle.
- Concepts like I-V characteristic, cut-off, cut-in speed etc. could be studied with the help of system.

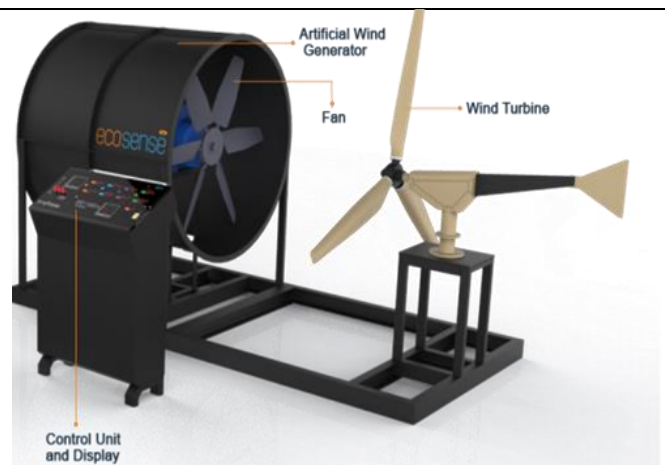


Fig.3-.Wind Energy Training System

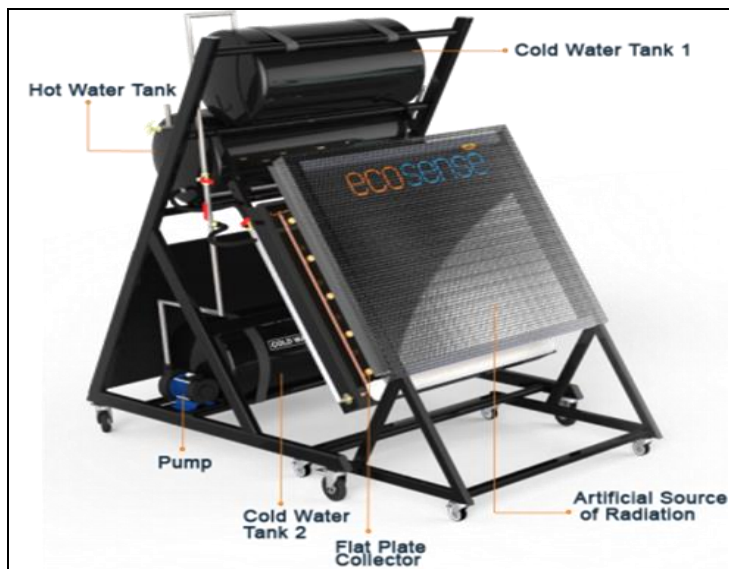


Fig.4-.Solar Thermal Training System

4.SOLAR THERMAL TRAINING SYSTEM

- Solar Flat-Plate Collector Based system is a replica of the solar water heating system designed to assist students to learn and experience different parameters of performance of Flat Plate Collector System.
- This system helps students in practical understanding of various technical parameters such as Overall Heat Loss Co-efficient, Heat Removal Factor and Efficiency at different flexible input parameters like radiation, wind speed etc.
- System has in built sensors which measure parameters like pressure, temperature, flow rate etc. mounted on a control unit.

5.SOLAR CONCENTRATOR TRAINING SYSTEM

- The Solar Parabolic Trough Collector Based System consists of parabolic reflectors, absorber tube, sun tracker, piping, storage tanks and a heat exchanger.
- A control panel would control different devices and also measure the different parameters of the system.
- The system can be used to perform experiments in heat transfer, parabolic trough characteristics and heat loss at different parts of the system.
- The system is highly flexible – it can be used with different working fluids, different absorbing materials, different piping insulation thickness and different types of storage tanks.
- This gives a lot of scope for research in heat transfer and related fields. Wind speed variation and flow velocity are other parameters which can be changed to show their impact on heat transfer and heat loss.



Fig.5-.Solar Concentrator Training System