

# **DESIGN AND DEVELOPMENT OF HYBRID POWER GENERATION**

## **INTRODUCTION TO ENGINEERING**

### **REPORT**

*Submitted By*

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**FRESHMAN ENGINEERING**

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**BONAFIDE CERTIFICATE**

Certified that this project “**HYBRID POWER GENERATION**” is the bonafide work of **G.Venu Gopal (21UEEC0090), M.Shanmukha Mani (21UEEA0077), Ch. Veera Naga Kalyan Babu (21UEEC0051), S. Indira Narayanamma (21UEEB0025), G. Seshikala (21UEEC0088), G. Chenna Kesava Reddy (21UEEL0030)** who carried out this project work under my supervision.

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**EXAMINER 1**

**EXAMINER 2**

## **ABSTRACT**

The most popular renewable energy technology is hybrid power system consisting of wind and solar energy sources because the system is reliable and complementary in nature. Wind PV hybrid system is commonly used in Distributed Generation(DG). The project proposes a new solution for improved voltage stability with quality power output. In this system voltage out from wind energy conservation(WECS) and photo voltaic cells panels, is given to dc converters. Independently controlled and connected to a common dc bus and from there it is inverted. The implementation of the proposed method is done by using Simulink platform. The performance of the suggested co-ordinate control system is analyzed by comparing the computer stimulation results with and without using controllers and it shows that the proposed system is more efficient.

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## **CHAPTER 1**

### **INTRODUCTION**

Electricity is most needed for our day to day life. There are two ways of electricity generation either by conventional energy resources by non-conventional energy resources. Electrical energy demand increases in world so to fulfill demand we have to generate electrical energy. Now a day's electrical energy is generated by the conventional energy resources like coal, diesel and nuclear etc. The main drawback of these sources is that it produces waste like ash in coal power plant, nuclear waste in nuclear power plant and taking care of this wastage is very costly. And it also damages the nature. The nuclear waste is very harmful to human being's also. The conventional energy resources are depleting day by day. Soon it will be completely vanished from the earth so we have to find another way to generate electricity. The new source should be reliable, pollution free and economical. Ensuring energy security and energy resources used in this country in the future need to be diversified. Also, to ensure the continuity of supply, an energy mix needs to be rationalized by considering important factors, such as the economic cost, environmental impact, reliability of supplies and convenience to consumers. The hybrid renewable power generation is a system aimed at the production and utilization of the electrical energy stemming from more than one source, provided that at least one of them is renewable.

## **CHAPTER 2**

### **EXISTING SYSTEM**

Solar panel can used to produce the current through Sun light and but can't get same output at every time so that use a circuit controller,then can get same output every time and that output current is stored in the Battery. And the solar panel way only not sufficient so another type is also required that is,wind rotator wheel.it rotates when the wind was produced in the nature and when that wind rotator rotates that rotator is attached to gear system and that gear system is attached to 12V DC generator. From that generator the output current is Stored in the battery. And for the general usage of current,the stored current from the battery can be used.



**FIG:1 EXISTING METHOD**

## **CHAPTER III**

### **PROBLEM IDENTIFICATION**

Now a Days we can see that in many countries like Sri-lanka etc.. are getting struggled with lack of electricity and they are supplying off day for one side of the country and off day for another side electricity .and also the electricity charges per unit in this generation was very high, poor people and middle class families can't vary those bills.so they need a simple way and low cost to use electricity for their daily usage. And In Some countries the lack of electricity had been occurred.they have no chance to use the electricity at any high cost. Hence they required a method to produce the electricity with low cost in large amount for their Daily Usage.



## CHAPTER 4

### DESIGN DIAGRAM

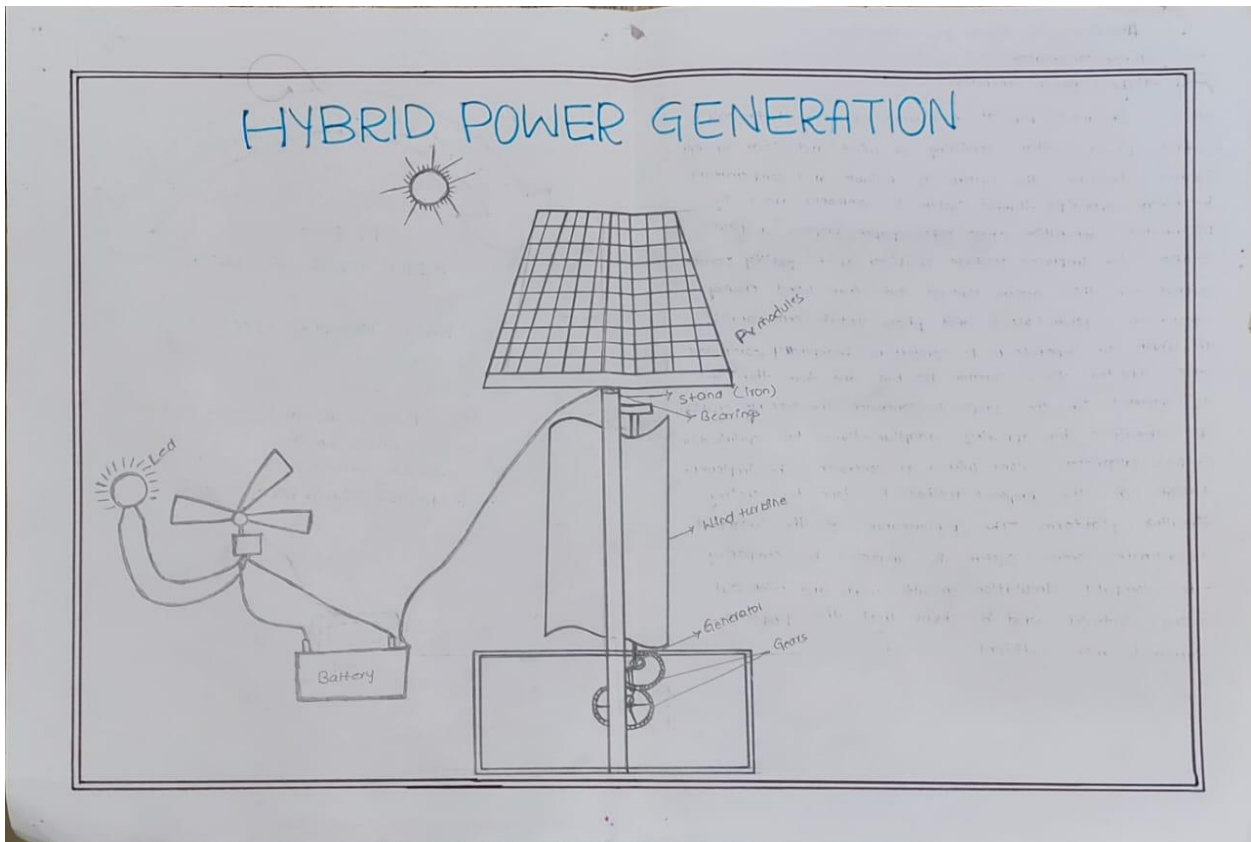


FIG:2- DESIGN DIAGRAM OF HYBRID POWER GENERATION

## **CHAPTER 5**

### **MATERIALS**

- Solar panel
- Wind turbine
- Gear set (60 T, 24 T)
- 12v DC Generator
- Battery(12V,1.3A)
- Regulator (For Solar Output)
- LED light Setup
- Barings
- ‘C’ Clamps
- Metal rods

## 5.1 SOLAR PANEL



FIG:3-SOLAR PANEL

Solar panels are those devices which are used to absorb the sun's rays and convert them into electricity or heat. Solar panels, also known as photovoltaic or PV panels, are made to last more than 25 years.

## 5.2 WIND TURBINE



FIG:4-WIND TURBINE

A wind turbine is a power generating device that is driven by the kinetic energy of the wind. instead of using electricity to make wind—like a fan—wind turbines use wind to make electricity.

### 5.3 GEAR SET:

Gears are wheels with teeth that slot together. When one gear is turned the other one turns as well. If the gears are of different sizes, they can be used to increase the power of a turning force. The smaller wheel turn more quickly but with less force, while the bigger one turns more slowly with more force.



FIG:5-GEAR SET

### 5.4 GENERATOR

Electric generator, also called dynamo, any machine that converts mechanical energy to electricity for transmission and distribution over power lines to domestic, commercial, and industrial customers.

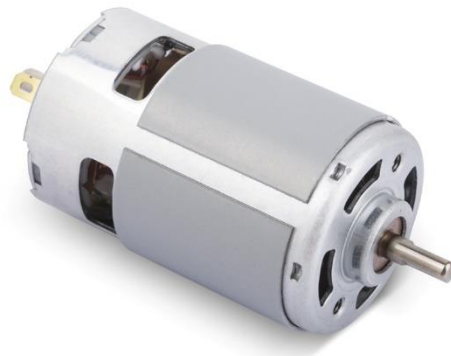


FIG:6 -GENERATOR

## 5.5 BATTERY

An electrochemical device (consisting of one or more electrochemical cells) which can be charged with an electric current and discharged whenever required



FIG:7 BATTERY

## 5.6 METAL RODS

Metal rods are specially formed pieces of metal and alloy that are shaped into a rod-like aesthetic hence the name. Metal rods are commonly used to give added support to a range of applications such as masonry structure.



FIG:8 METAL RODS

## CHAPTER 6

### WORKING

By the use of sunlight, place solar panel above the house it produces electricity and the produced electricity from the solar panel is not enough for the whole house so that use wind turbine and when this wind turbine rotates with the help of wind, that is fixed gear set under the turbine through that gear set it is connected to generator and if gear rotates that generator starts producing electricity. And the electricity produced from solar panel and wind turbine will be stored in the battery {battery will be get charged} And that battery will work as inverter and we can supply it for our house usage and if the load of solar panels and wind turbines are increased that can supply electricity for large case like factories also.

## CHAPTER 7

### HARDWARE DISCUSSION



FIG:9 –Hybrid Power Generation

## **CHAPTER 8**

### **ADVANTAGES & DISADVANTAGES**

#### **ADVANTAGES**

- Low cost Electricity, Low Maintenance
- Renewable Energy Source.
- Reduces Electricity Bills
- No lack of Electricity
- Done by natural resources
- Required voltage of electricity will be produced

#### **DISADVANTAGES**

- Won't work in winter season and rainy days.
- Won't Give Unique output it is based on rays of sunlight



## **CHAPTER 9**

### **CONCLUSION**

The use of solar–wind hybrid renewable energy system is ever-increasing day by day and has shown incredible development in last few decades for electricity production all over the world. By using this development of new technologies and researches in the field of solar wind hybrid renewable energy system, a new difficulty arises, which become much more easily solved with new techniques. The presented review paper reported the different techniques and ideas about and its energy utilization.

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## REFERENCES

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2	Low Expense Vertical Axis Wind Turbine	International Journal of Mechanical Engineering and Technology.	S. Ramu, M. Abhilash, M. Ajay, S. Aravind and M. Hariprasad	2008
3	Hybrid power Generation	Kindle Store	Yatish T. Shah	2004
4	<a href="https://www.routledge.com/Hybrid-Power-Generation-Storage-and-Grids/Shah/p/book/9780367678401">https://www.routledge.com/Hybrid-Power-Generation-Storage-and-Grids/Shah/p/book/9780367678401</a>			
5	<a href="https://www.moneycontrol.com/news/business/companies/adani-green-commissions-390-mw-wind-solar-hybrid-power-plant-in-jaisalmer-8597611.html">https://www.moneycontrol.com/news/business/companies/adani-green-commissions-390-mw-wind-solar-hybrid-power-plant-in-jaisalmer-8597611.html</a>			

## **CHAPTER 10**

### **LIST OF MODELS**

#### **CARPENTRY:**

- ✦ WOODEN WINDOW
- ✦ SLIDING DOOR
- ✦ WHEEL CHAIR
- ✦ CRANK AND SLOTTED
- ✦ WOODEN SHELF

#### **ELECTRONICS :**

- ✦ EMERGENCY LIGHT
- ✦ POWER SUPPLY BOARD
- ✦ PORTABLE MOBILE CHARGER CIRCUIT
- ✦ RELAY BOARD

#### **MACHINE SHOP:**

- ✦ SHEET METAL TRAY
- ✦ MACHINE VICE
- ✦ BOLT AND NUT ASSEMBLY
- ✦ SIMPLE AND COMPOUND GEAR DOWN

## **MODEL 1**

### **CARPENTRY :-WOODEN WINDOW**

**AIM:**

To design a wooden window as per given dimensions for the given work

**APPARATUS:**

Wood, Nails, Hammer, Wood cutter, Window glass

**PROCEDURE:****Step-1 (Openings):**

Windows can be fitted either during construction or into pre-formed openings at a later stage. Openings can be formed during construction using either specific purchased frame templates or site constructed templates, these templates should produce openings between 10 and 20mm larger than the total window size. A tight fit of adjacent materials should be avoided where there is a danger of distortion of the frame. Fitting however should not exceed 10mm on each side. The above applies for replacing your existing windows, measurements should ideally allow a 10mm tolerance overall (5mm each side) taken from the smallest point of the opening.

### Step-2 (Spacing the window):

Before any fixings are used the window should be packed all four sides level and plum in the opening. When building-in a continuous support at cil level can be provided by a mortar bed. Cil and head packing's should be a maximum of 150mm from each jamb and beneath each mullion. It is very important when fitting to ensure the frame doesn't become distorted as this can prevent movement of sashes, be especially careful for this problem when installing sliding sash windows. Once packing's have been fitted check the operation of all casements prior to final fixing

### Step-3 (Fixing the window):

Side fixings should be used at 150mm from the top and bottom of the frame, and a maximum of 450mm between fixings. Windows above 1800mm wide should also be fixed in the center of the head. You can fix into the brickwork using either a screw and anchor plug or self-tapping concrete anchor, ensure the fixing is at least 25mm into the brickwork, preferably 50mm. We recommend using an 8x120mm fixing (can be purchased from our website). Both the frame and brickwork will need to be drilled creating a pilot hole to fix into. Fix the window through the frame, where possible using unobstructive locations. The fixings must be at the same point as the spacer to ensure the frame does not become distorted.

#### Step-4 (Sealing the window):

To prevent air infiltration between the window and the adjacent wall the gap should be sealed, this can be done using an expanding foam seal. An additional seal can then be provided by a silicone or poly sulphide based sealant.

#### Step 5 (Decoration):

If your window is not pre-finished, finishing should be carried out in dry weather using good exterior quality materials in accordance with the manufacturer's instructions.

#### Diagram:

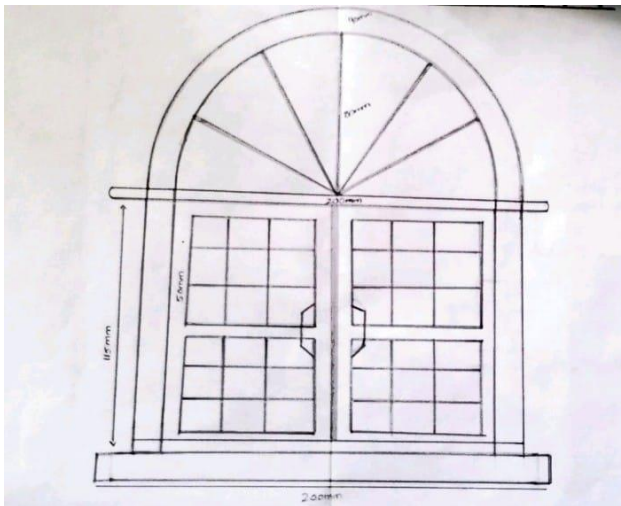


FIG:10 WOODEN WINDOW

**Result:** Thus, the wooden window was made with the proper dimensions.

## **MODEL 2**

### **ELECTRONIC : POWER SUPPLY BOARD**

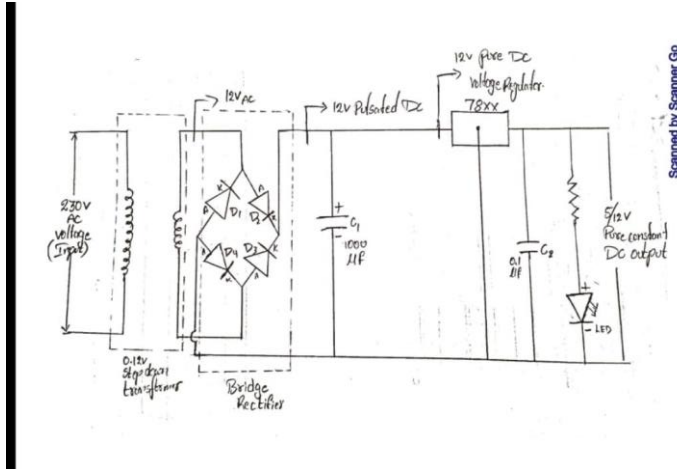
**AIM :** To make a power supply board as per the circuit.

#### **APPARATUS :**

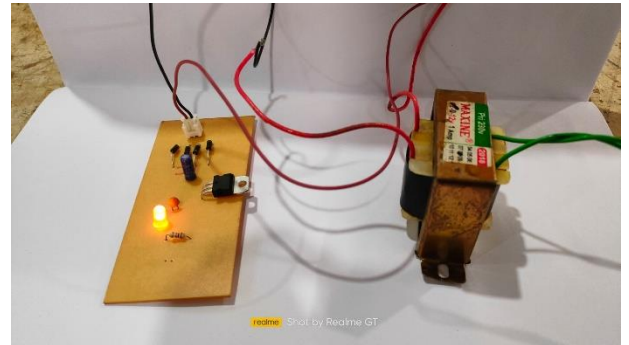
Diodes, stepdown transformer, Electrolytic Capacitor, ceramic capacitor, led, copper clad, Multi meter, voltage regulator.

#### **PROCEDURE :**

1. Take a copper clad and clean the copper clad with the help of sand paper. print the circuit in the glassy paper on the copper clad and the iron it the glassy paper stick into the copper clad.
2. put that copper clad in the  $\text{FeCl}_2\text{O}_3$  solution remove the glassy paper from the copper clad with the help of the glassy paper the circuit is transferred to the clad.
3. After that copper clad place into the ferric chloride solution for the removal of the excess copper. This process is called etching.
4. After the etching process completed we can fix all the components on clad as per the circuit.
5. There after soldering will done then we can fix all the transformer to the input and with the help of multi meter we can check the output.



**DIAGRAM:**



**FIG:11 POWER SUPPLY BOARD**

**RESULT :** By the following process we successfully made a sheet metal tray.



**MODEL 3**  
**MACHINE SHOP: SHEET METAL TRAY**

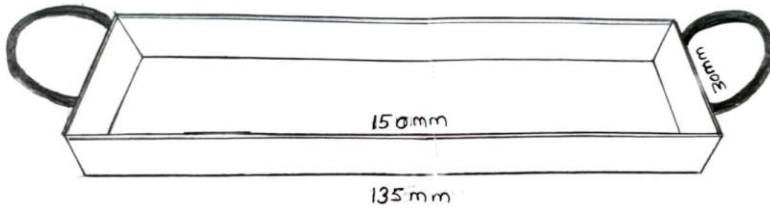
**AIM: -** To learn machinery work

**APPARATUS:**

1. CUTTER
2. HAMMER
3. SCISSORS METAL SHEET
4. SCALE
5. M-SEAL
6. METAL SHEET

**PROCEDURE: -**

- 1 Firstly, we have to cut the sheet metal tray as per the measurements mentioned in the diagram.
- 2 Now we have to bend fold using the tools [mallet, hammer].
- 3 Finally, we will get the sheet metal tray.

**DIAGRAM :****FIG:12 SHEET METAL TRAY**

**RESULT :-** The process of making a sheet metal tray is followed and thus the above metal tray was prepared.