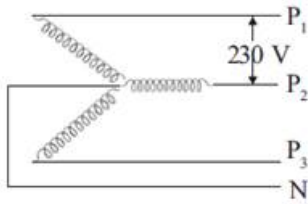


## 4. Power transmission and distribution

### Let us Assess

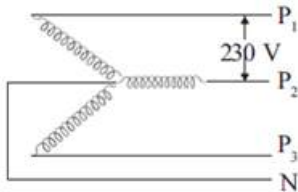
#### 1. Question

The figure of a star connection is shown below. Observe the figure and correct mistakes, if any, and answer the questions:

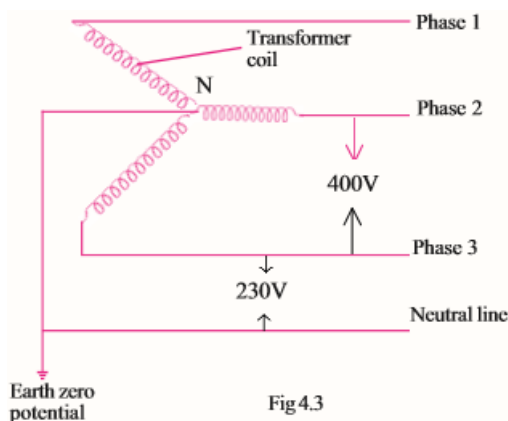


- (a) Each end of the secondary coils coming out of a distribution transformer is connected to a common point. What is the name given to the line that starts from here?
- (b) Which pairs of lines are used in household electrical wiring? What will be the voltage between them?
- (c) What is the voltage between two phase lines?

#### Answer



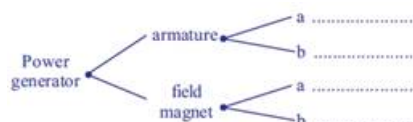
In the given figure, the potential difference between the poles is 230V but in case of star connected network in the household, the potential difference between two phases is 400V. The potential difference between line and phase is 230. So the star connection should be like the following.



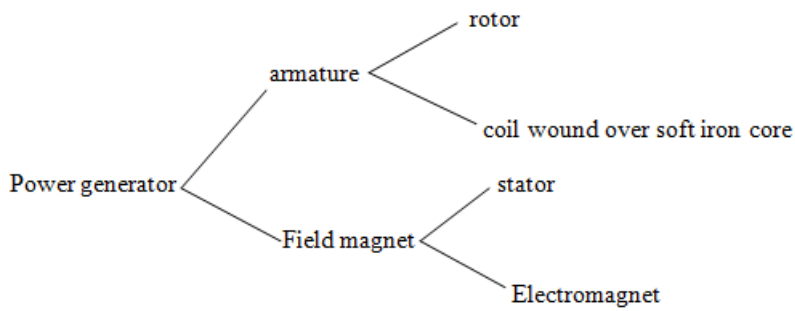
- a) The line that starts from the common point is called neutral line. The potential of this line is zero.
- b) The phase line, neutral line, and earth line are used in the household electrical winding. The voltage difference between a phase line and the neutral line is 230V.
- c) The voltage between two phase lines is 400V.

#### 2. Question

Using the information given in the brackets, complete the flow chart. (rotor, coil wound over the soft iron core, electromagnet, stator)



#### Answer



A power generator consists of two parts:

- 1) Field magnet
- 2) Armature

**Field Magnet:** It is a static part of a generator which is made up of an electromagnet or a permanent magnet used to produce magnetic field that interacts with the armature of the generator.

**Armature:** Armature is the rotating part of an electrical generator which is wound by many coils used to carry current (produced due to interactions with the magnetic field of the field magnet) and allows the flow of induced emf.

## Extended Activities

### 1. Question

Prepare and exhibit posters showing the need for conserving electrical energy.

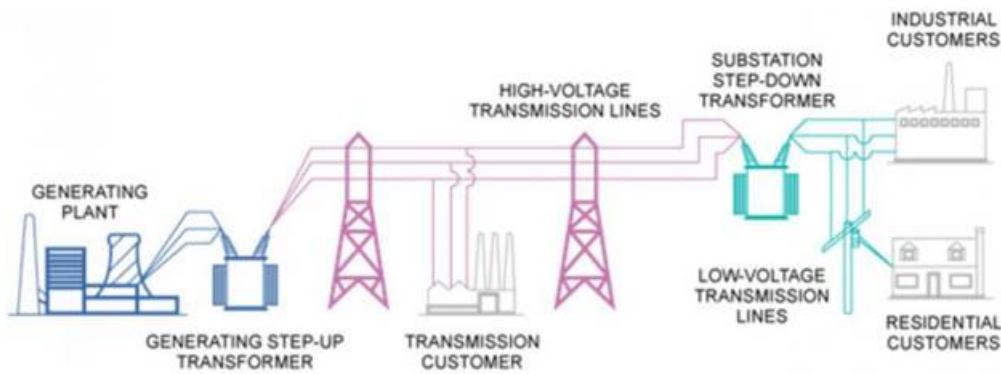
**Answer**



### 2. Question

Exhibit a model of electrical distribution network.

**Answer**

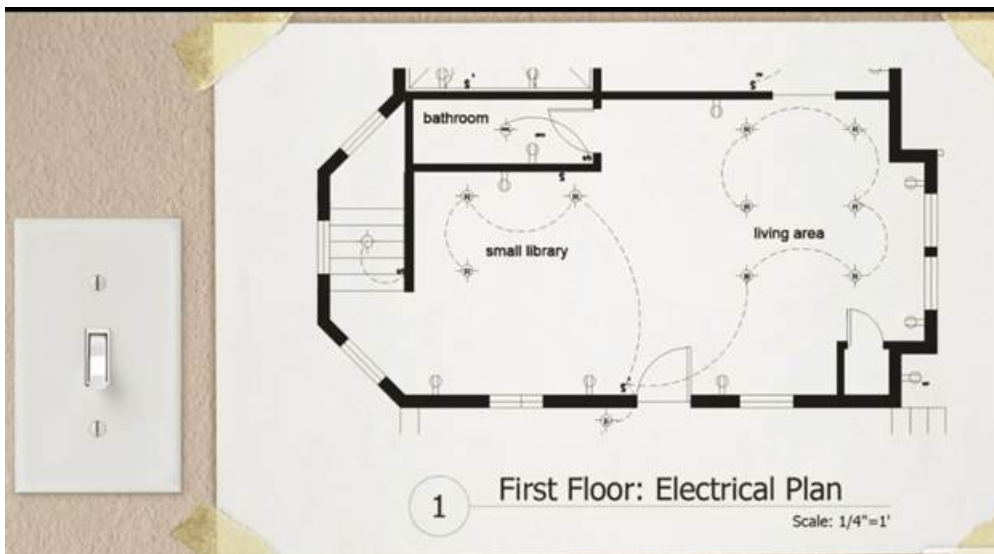


### 3. Question

Draw an electrical circuit containing the electrical appliances required for your class room.

### Answer

A sample electrical circuit plan drawn using AutoCad is given here:

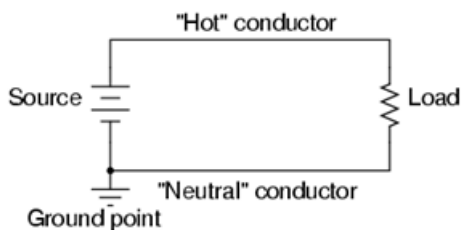


### 4. Question

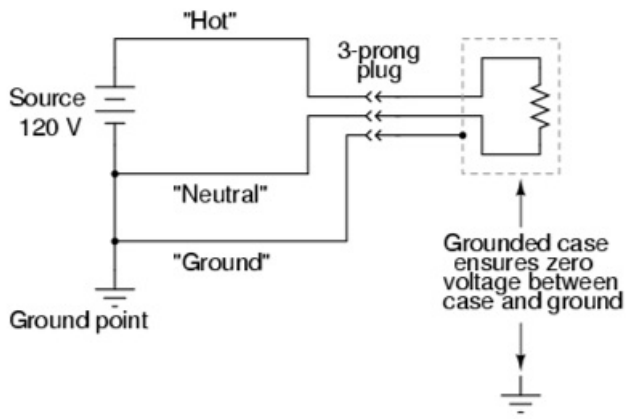
In order to ensure safety in electrical circuits, how can the earthing arrangement be done? Discuss and prepare a note.

### Answer

Earthing is the process of connecting the neutral part of the equipment or the source to the ground by using a low resistance wire. By this method the sudden flow of electrical energy is discharged to the earth.



In an electrical appliance, the hot conducting wire and neutral wire are usually insulated from the outer conducting material. But sometimes it so happens that these materials come in contact with the outer conducting material. If the neutral wire touches the conducting material, there is no much problem but if the hot wire touches the outer material it causes shock to the person touching the equipment. To prevent these failures from effecting people, the outer material is earthed i.e. by connecting a conductor between the outer case and the ground. So there is no potential drop ( $V=0$ ) between the outer case and the ground. If the hot conductor accidentally touches the metal appliance case, it will create a direct short-circuit and the charge is transferred to the ground. So The user of the appliance will remain safe.



## 5. Question

Observe and record the meter reading in your house for 10 consecutive days. Based on this, find out the average consumption per day. Find out methods to reduce consumption and record them. Present your findings in the Energy Club.

## Answer

DAY	METER READING (KWh)
1	10
2	15
3	12
4	10.5
5	11
6	15
7	10
8	9
9	11
10	10

Average consumption = (sum of meter readings everyday)/(no: of days) =  $113.5/10 = 11.3\text{KWh}$

Methods to reduce energy consumption;

1. By replacing traditional incandescent bulbs with CFL and LED bulbs, which use 50 -80% less energy when compared to others. CFL bulbs also last for a longer periods of time.
2. Unplug the electronic devices when they are fully charged or not in use. Also, the power supply should be switched off.
3. Insulating ceilings to the right ratings will decrease the energy consumption to a great extent.
4. Devices like a washing machine, refrigerator and heater should be maintained well. Washing clothes in cold water can reduce the energy consumption by up to 50%. Refrigerator temperature should be maintained between (37-40)°F and freezer temperature should be maintained between (0-5)°F.
5. Buy appliances with good energy ratings.