

ELECTRICAL APPLIANCES

Subject Code: 26732

Technology: Electrical

3rd semester

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Chapter:01

Basic principle of Electrical Appliances

Electrical appliances: Appliance means a device that consumes electricity at a voltage greater than extra low voltage and in which the electricity is converted into heat, motion or another form of energy or is substantially changed in its electrical character.

Motor driven Appliances:

- 1.Refrigerator
- 2.Electric iron
- 3.Geyser
- 4.Microwave oven

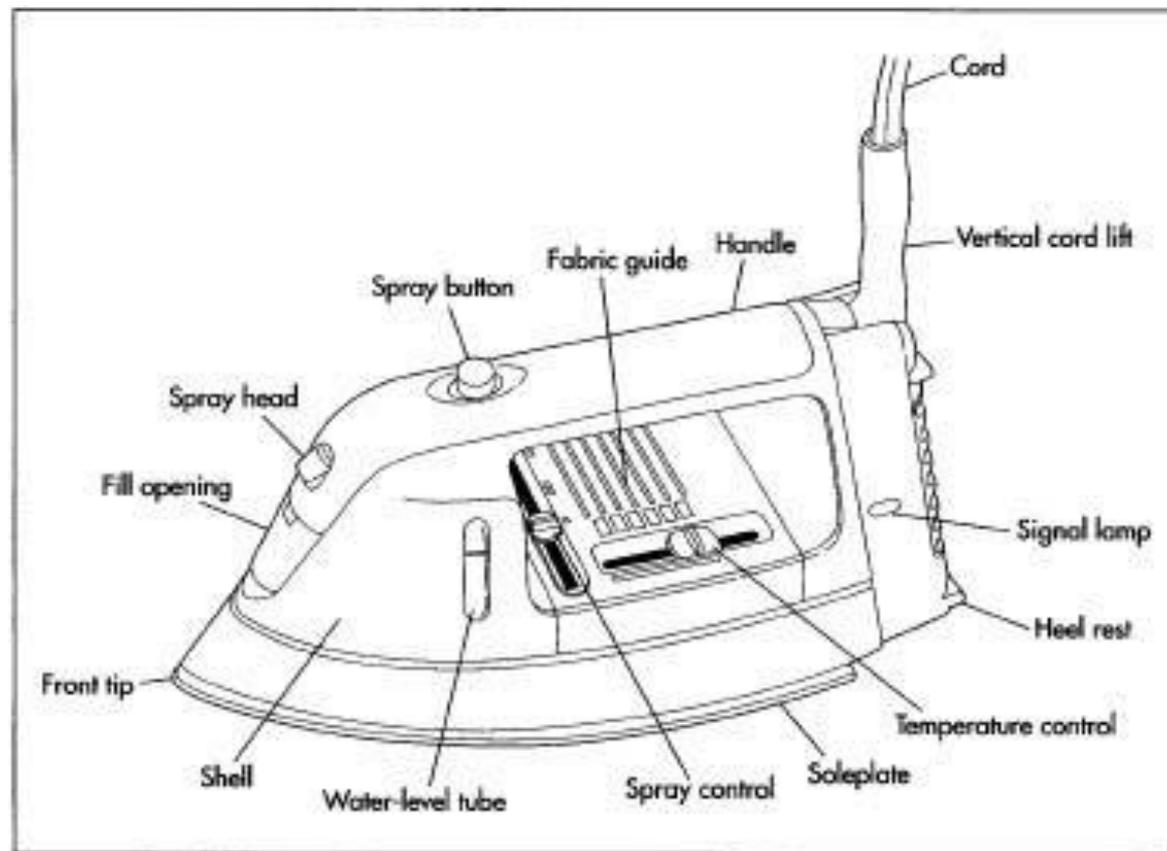
Chapter:2

Electric iron

Electric Iron:An electric iron is a household appliance used to remove creases or wrinkles of the clothes by the combination of heat and pressure.

Different types of electric Iron: There are two types of irons – Steam and Dry Irons. Both of them are made by Iron Manufacturers that are perfect for the modern age. Domestic electric irons typically operate at temperatures ranging from 121°C (250°F) to 182°C (360°F).

- Different parts of electric iron: An electric clothes iron has the following common parts:
- Handle. The handle of an electric iron is made with plastic or wood. ...
- Sole plate. ...
- Cover Plate. ...
- Pressure Plate. ...
- Pilot Lamp. ...
- Heating Element. ...
- Thermostat. ...
- Capacitor.



- **Operating principles of an Electric Iron:**

- An electric iron is based upon the principle of heating effect of current. This principle states that when an electric current is passed through a conductor, it generates heat because of the resistance present in it. The resistance converts electrical energy into heat energy. The formula for the heat produced due to resistance and current is given by $H=I^2RT$
- . This principle has many applications like heater, electric iron etc. in these types of devices they generally have a coil whose resistance is much higher which in turn converts electricity into heat energy. Not all metals can convert into heat energy. Only some metals have this property.
- The other given options do not have any role in these types of appliances where heating is required. The heat produced also depends on the voltage applied across the appliances. But more the current passing through more heat will generate. A good conductor of electricity does not show this property. The materials having high resistance can only show a heating effect.

Operation of thermostat in an automatic electric Iron

- The thermostat in iron makes use of a bimetallic strip. This bimetallic strip is made up of two different types of metals (brass and iron) with a different coefficient of expansion bonded together. Therefore, in the presence of heat, the bimetallic strip expands differently

Faults , Causes and remedies of an electric iron

- Dry iron not heating enough.
- SOLUTION: Thus to resolve this problem, you first need to check if you have made all the connections properly and in accordance with the user manual. ...
- Dry iron not working. ...
- Dirty Sole Plate. ...
- Iron sticking to clothes. ...
- Mineral build-up.

Chapter : 3

Rice cooker and Induction Cooker

- Rice cooker: A rice cooker or rice steamer is an automated kitchen appliance designed to boil or steam rice. It consists of a heat source, a cooking bowl, and a thermostat



- Induction cooker:

Induction cooking is performed using direct electrical induction heating of cooking vessels, rather than relying on indirect radiation, convection, or thermal conduction. Induction cooking allows high power and very rapid increases in temperature to be achieved:



Function of Rice cooker

- A rice cooker or rice steamer is an automated kitchen appliance designed to boil or steam rice. It consists of a heat source, a cooking bowl, and a thermostat. The thermostat measures the temperature of the cooking bowl and controls the heat.

Function of Induction cooker

- Induction cooking is a method of cooking that uses a copper coil underneath the cooking surface to generate electromagnetic energy. This energy transfers directly to your cookware to make it hot enough to cook food.

Main parts of Rice Cooker

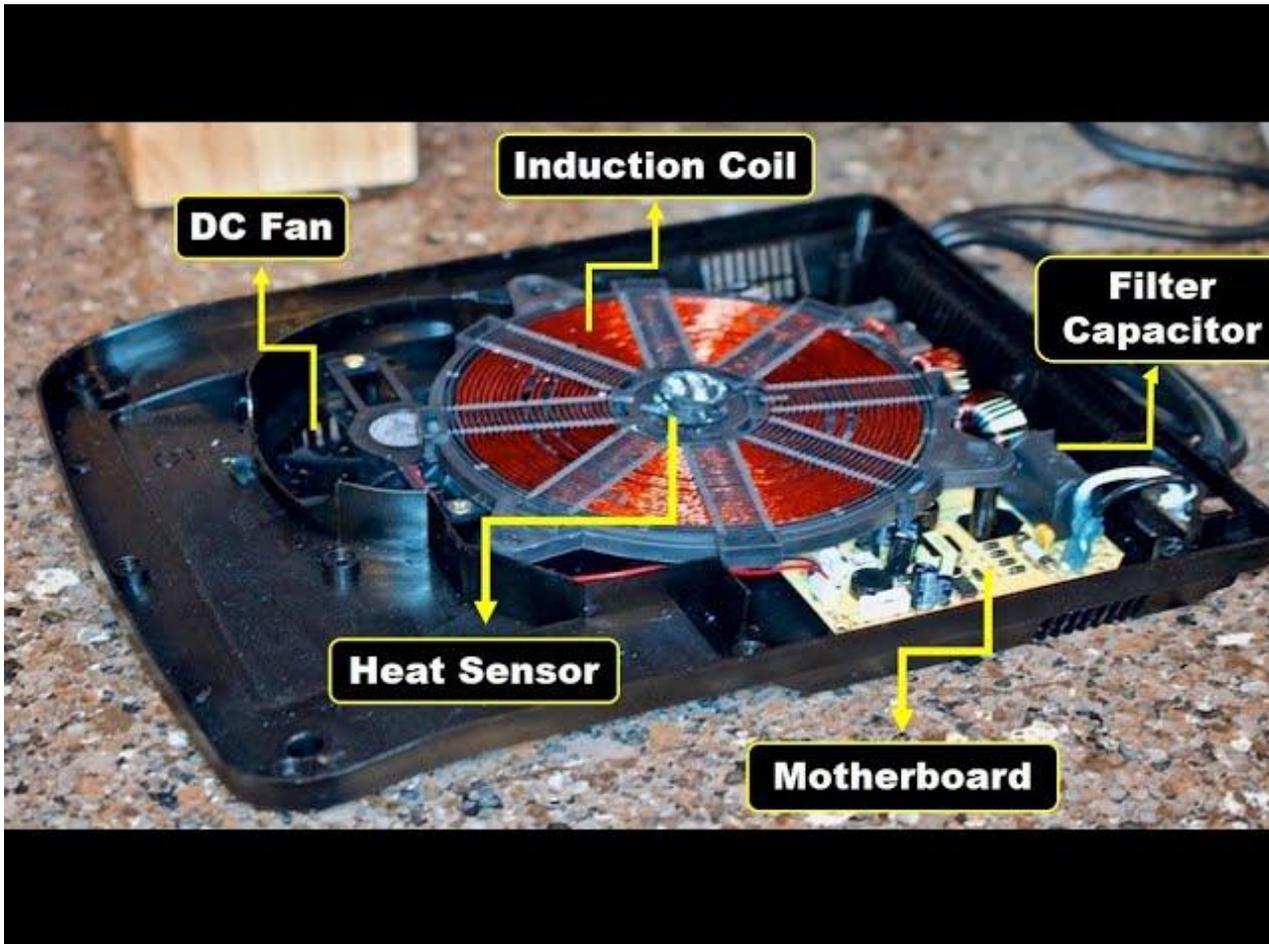
- It consists of a heat source, a cooking bowl, and a thermostat. The thermostat measures the temperature of the cooking bowl and controls the heat. Complex, high-tech rice cookers may have more sensors and other components, and may be multipurpose.



Main parts of Induction Cooker

The main parts of an induction stove are:

- Glass-ceramic surface: This is the flat surface of the cooktop where you place your cookware. ...
- Coil: Beneath the glass-ceramic surface is a coil of copper wire. ...
- Control board: The control board is the brains of the induction stove



Faults ,Causes and Remedies of Rice cooker and induction cooker

- The shell is deflated, the base is misaligned: ...
- Rice is not cooked and tripped: ...
- Paste pot: ...
- Burn out the heating plate:

Causes

- Power Cord Problems.
- Debris Or Deformities Between The Inner Pot And Heating Plate.
- Thermal Fuse Issues.
- Internal Circuitry Issues.
- Dead Battery.
- Old Or Cheaper Model Version.

Remedies

- Wash rice in a separate bowl.
- Wipe the exterior on the inner pot before use.
- Take note of rice proportions.
- Keep the lid closed.
- Know how to clean your rice cooker

Chapter :04

Electric Kettle and Geyser

- Electric Kettle:

An electric kettle plugs into an outlet and uses electricity to power an integrated heating element, rather than using a stovetop burner to heat water.

Kettle



Different parts of Electric kettle

- The electrical components of a tea kettle include the heating element, a thermostat that turns off the kettle automatically if it is boiling dry, an on-off switch and its attachments, a connection linking the element to the cord, and the plug. These are received at the plant as assembled units.

Electric Kettle Parts



Faults ,Causes and remedies of an electric kettle

A bad power connection is among the most typical problems that arise with electric kettles. Start by looking for actual problems like any damage, such as cuts or broken wires, on the power cable. It's advisable to replace the cord totally if there are any problems rather than attempting to fix it.

Geyser



Electric Circuit

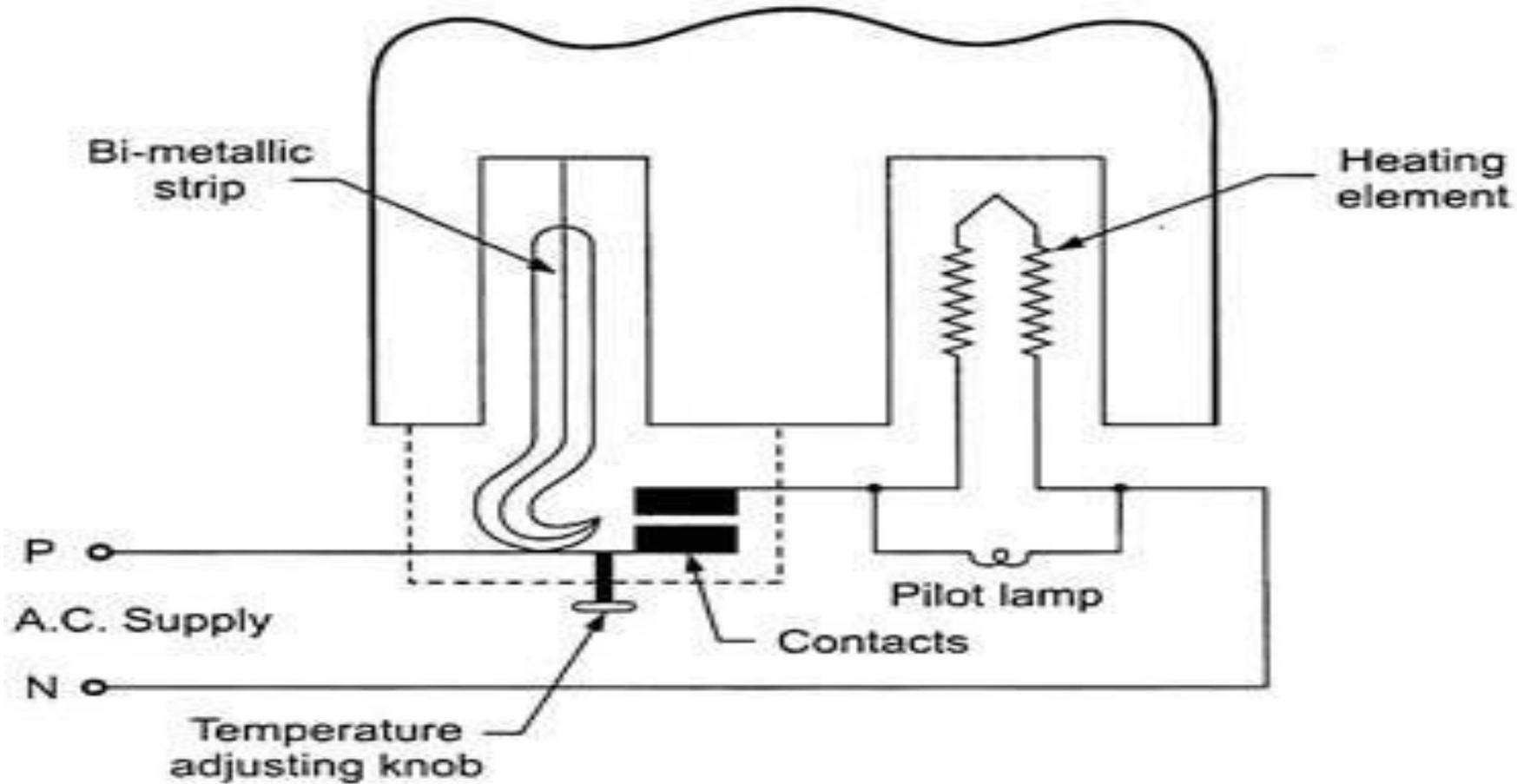
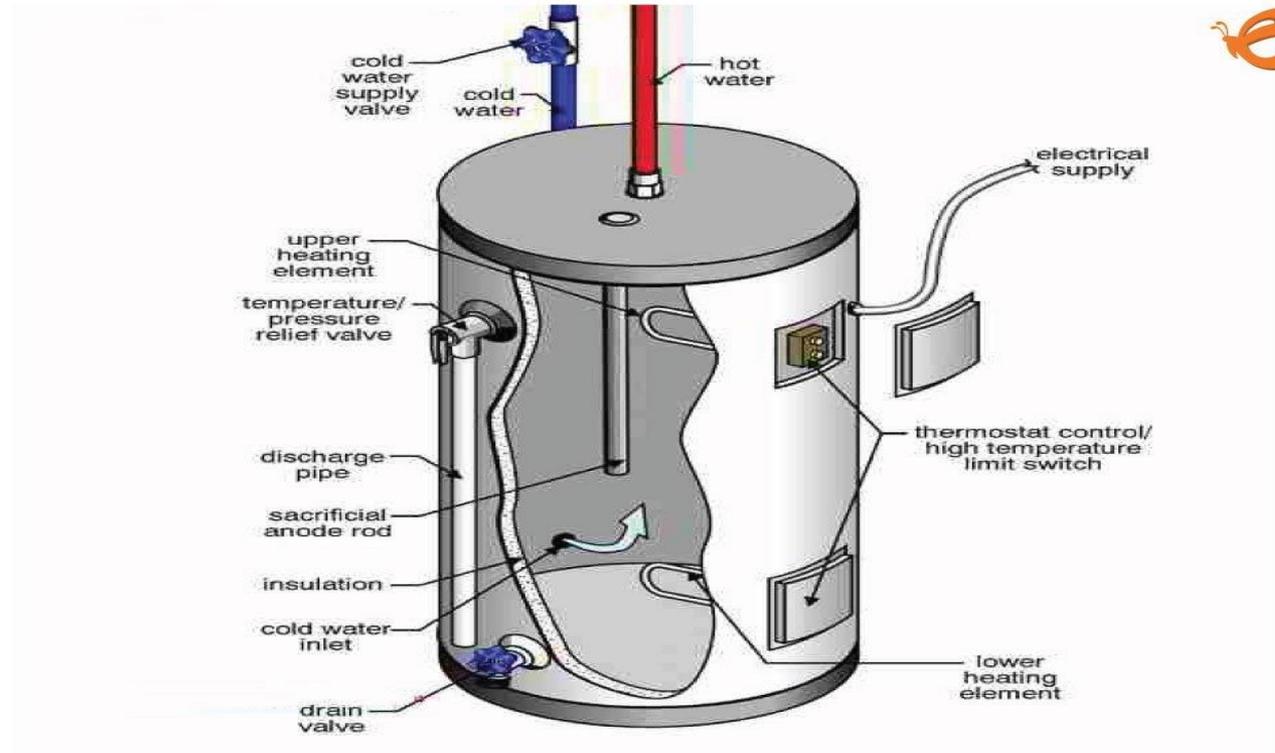
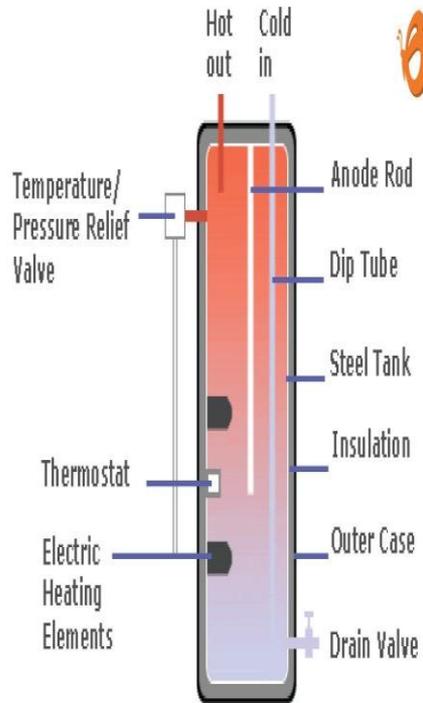


Fig. 3.4 *Electric Circuit of Geyser*

Figure of Geyser



Construction and work

- The geyser consists of a water tank fitted with two pipes – one for inlet of cold water and the other for outlet of hot water. The water tank is fitted with heating elements which are controlled by thermostats.
- Both the heating elements do not function simultaneously. First the top heating element functions until the upper tank is hot and then the function is transferred to the bottom heating element, which has its own thermostat. The thermostat is mainly a bi-metallic disc with each metal having a different coefficient of expansion for heat. So, when it gets heated up, it bends and the contact with the switch is broken.

Some Problems and Remedy

- **The scenario:** You noticed your electric **water heater tripped the circuit breaker**. So you went to your electrical panel and reset the breaker. But then a little later your water heater's circuit breaker tripped again. So why's this happening?
- **The most likely causes are:**
 - Burnt out heating element
 - Bad thermostat
 - Wiring/Electrical problem
- But before we get into those problems, there are a few things you need to know:

Problems and remedy cntd...

- **Do not keep flipping the breaker back on.** This can overheat the wires in the circuit (which can lead to a fire), wear out the circuit breaker (which can cause it to not trip later) and damage your water heater further.
- **Do not replace the breaker with a higher-rated breaker.** If you increase the breaker size without replacing the wiring and the rest of the circuit, you've basically just removed the safety device of the breaker. Now the breaker will let additional electricity flow to the circuit, which can overheat wires and cause a fire.

Possible problems causing to trip your breaker.

- *Only one heating element need to be on at a time.*
- However, when a thermostat goes bad, it can create a problem where both heating elements run at the same time. This draws more electricity than the circuit can handle, causing the circuit breaker to trip.

- **Bad breaker or electrical wiring**

The problem may not actually be with the water heater. It could be that:

The breaker itself is worn out and tripping needlessly.

A wire is loose in the electrical panel, which is causing a short circuit

Problems and remedy cntd...

- You should have an electrician check the electrical connections.
- **Burnt out heating element**
- The heating element is the part of water heater that heats the water.
- Most electric water heaters have 2 heating elements: one on top and one on the bottom.
- Usually, when the heating elements fail, they simply burn out and the only way you'll notice is that the water isn't as hot as it once was.

Problems and remedy cntd...

- But sometimes, the heating element casing can split and expose the electrical components directly to the water or tank. This short circuit can flip the high limit switch on your water heater and/or cause the water heater's breaker to trip.
- **Bad thermostat** : Thermostat does not work properly, Replace it.
- **Insulation Failure**: Due to it short circuit or leakage current may flow resulting body current/ create spark / trip the fuse or breaker. So check the wiring /change the wire.
- **Loose connection**: It can also create spark resulting open circuit, burning of insulation & short circuit.

THANK YOU