



SVCR GOVT DEGREE  
COLLEGE, PALAMANER

**PROJECT WORK:**

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**CLASS: 2<sup>ND</sup> B.SC**

**SUBJECT: PHYSICS**

**GROUP: MPCS**

**TYPE OF PROJECT: INDIVIDUAL**

**TOPIC: TYPES OF EARTHING**



# TYPES OF EARTHING

Earthing is defined as “the process in which the instantaneous discharge of the electrical energy takes place by transferring charges directly to the earth through low resistance wire.” Low resistance earthing wire is chosen to provide the least resistance path for leakage of fault current.

2. What are three main reasons for earthing?

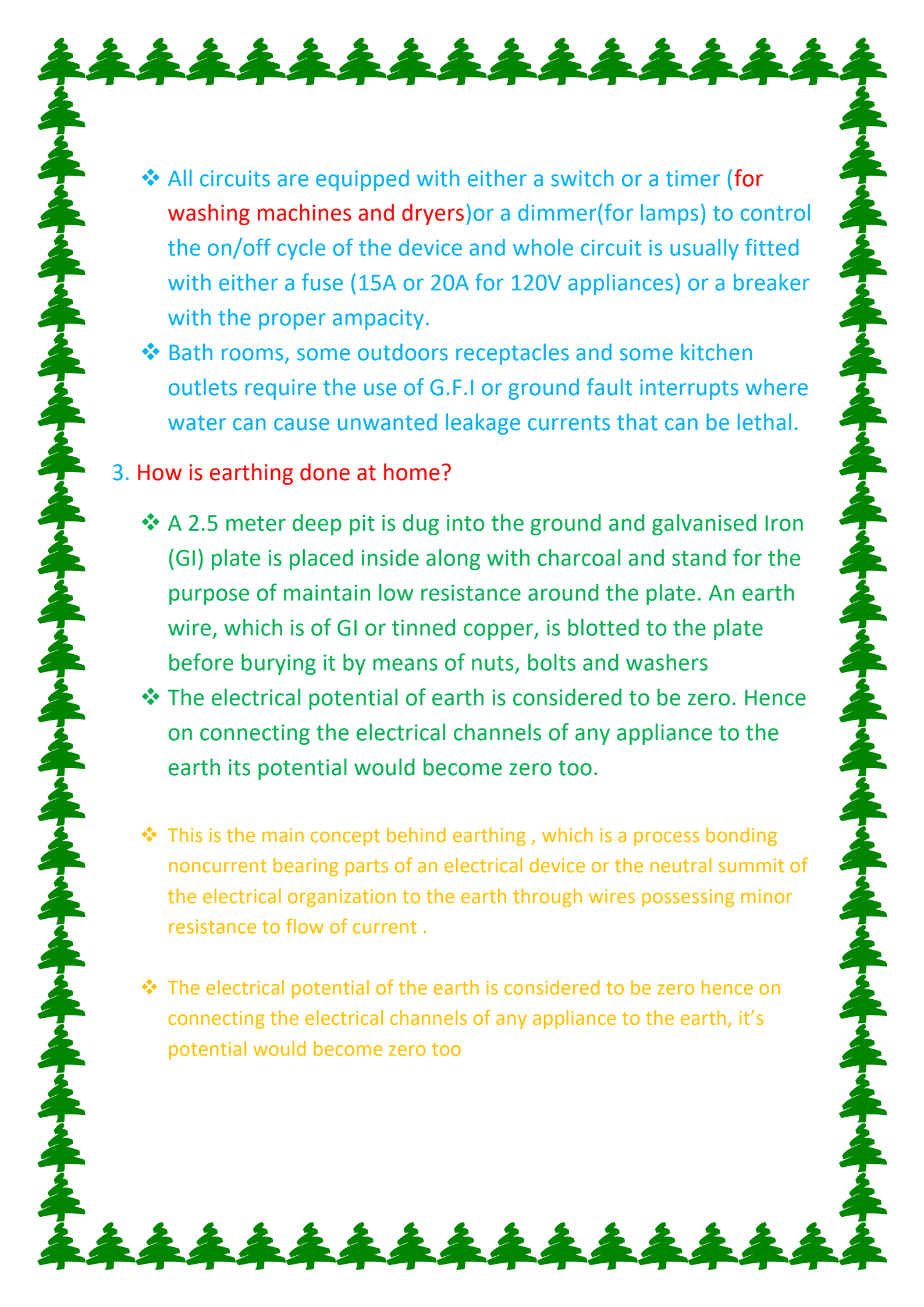
**It keeps people safe by preventing electric shocks. It prevents damage to electrical appliances and devices by preventing excessive current from running through the circuit. It prevents the risk of fire that could otherwise be caused by current leakage.**

Importance of earthing :

- The most common type of wiring in modern homes is in the form of non-metallic (nm) cable, which consists of more individual wires wrapped inside a protective plastic sheathing. NM cable usually contains one or more “hot” (current carrying wires), a neutral wire and a ground wire.

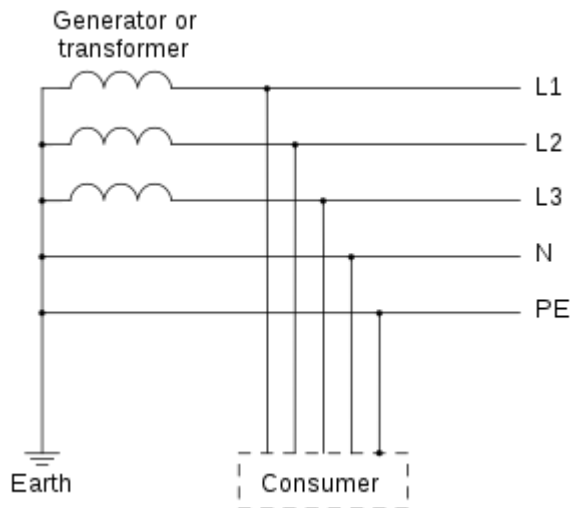
3. Which type of connection is used in wiring?

All household connections made to the mains are parallel circuits in respect of the same voltage (lamps, toasters, refrigerators, stereos, washing machine, air conditioners, computers, monitors, kettles and other hand stoves, wall ovens, dryers, hot water tanks, kitchen equipments, TV sets, hairdryers, power receptacles etc...) are usually powered by 220v circuits.

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- ❖ All circuits are equipped with either a switch or a timer (for washing machines and dryers) or a dimmer (for lamps) to control the on/off cycle of the device and whole circuit is usually fitted with either a fuse (15A or 20A for 120V appliances) or a breaker with the proper ampacity.
  - ❖ Bath rooms, some outdoors receptacles and some kitchen outlets require the use of G.F.I or ground fault interrupts where water can cause unwanted leakage currents that can be lethal.

### 3. How is earthing done at home?

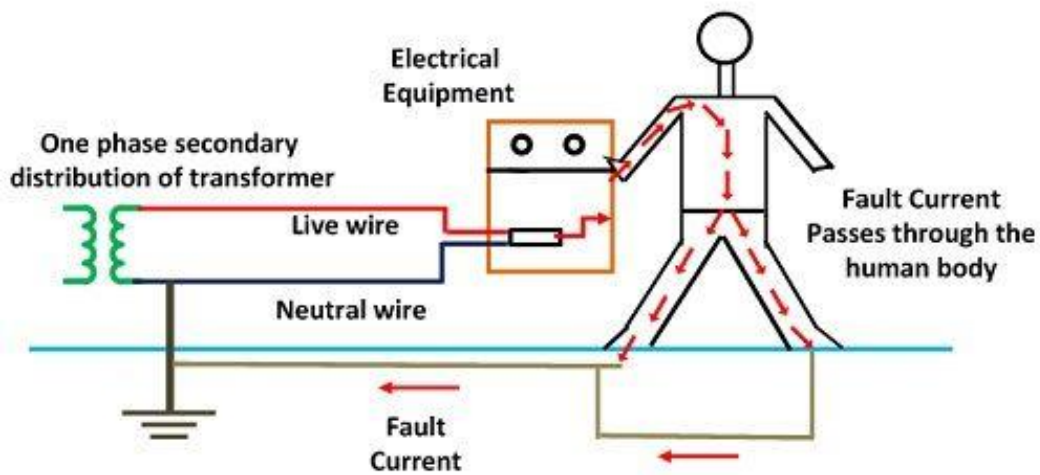
- ❖ A 2.5 meter deep pit is dug into the ground and galvanised Iron (GI) plate is placed inside along with charcoal and stand for the purpose of maintain low resistance around the plate. An earth wire, which is of GI or tinned copper, is blotted to the plate before burying it by means of nuts, bolts and washers
- ❖ The electrical potential of earth is considered to be zero. Hence on connecting the electrical channels of any appliance to the earth its potential would become zero too.
- ❖ This is the main concept behind earthing , which is a process bonding noncurrent bearing parts of an electrical device or the neutral summit of the electrical organization to the earth through wires possessing minor resistance to flow of current .
- ❖ The electrical potential of the earth is considered to be zero hence on connecting the electrical channels of any appliance to the earth, it's potential would become zero too



### Earthing system

#### 4. Why is earthing required for houses?

1. To warrant that all pieces of equipment in use by the occupants of a building are at earth potential, of a building are at earth potential ,thus safe guarding them from electric shocks through direct contact
2. To protect electrical apparatus from getting damaged due to weighty currents along electrical lines
3. To protect tall buildings from getting harmed under lightning

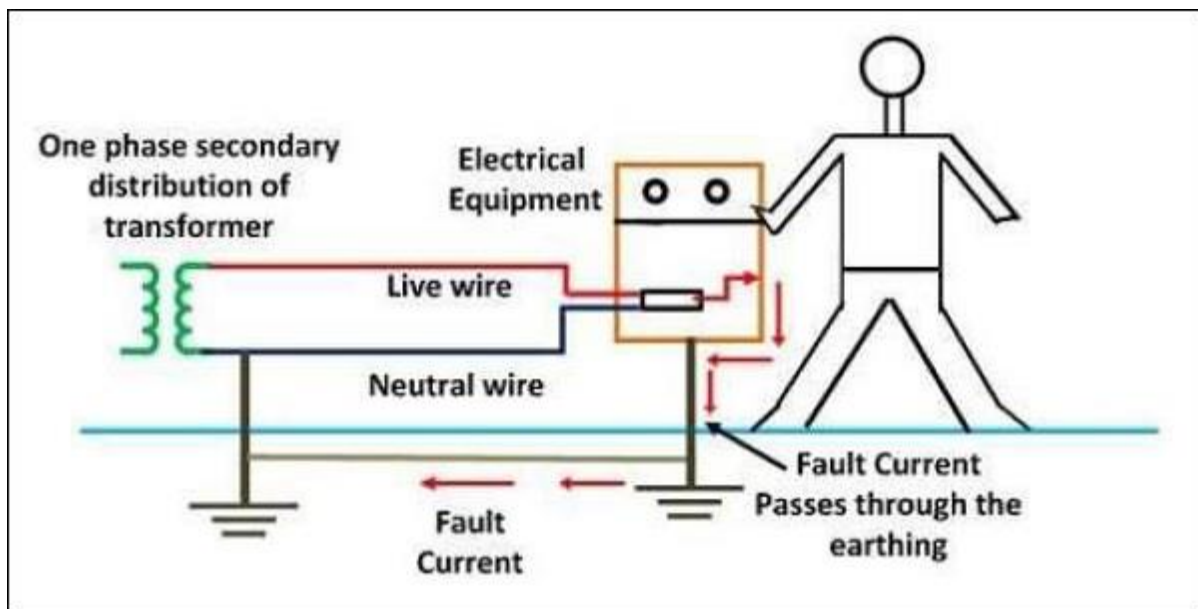


Electrical System Without Earthing

Circuit Globe

### 5. What happens if an appliance is earthed properly?

- ❖ We know that current flows from a higher to a lower potential .Any electrical appliance or any electricity line which has been connected to the earth is now at zero voltage.
- ❖ In the case of any overloading of current, the immediate discharge of electrical energy takes place to the ground, without harming the appliance or the user.
- ❖ Even if the insulation of the equipment fails, if it is earthed , the appliance is safe enough .



Electrical system with earthing

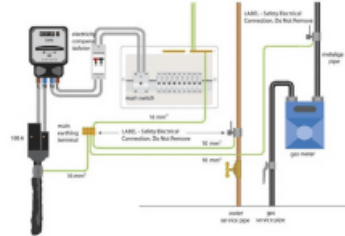
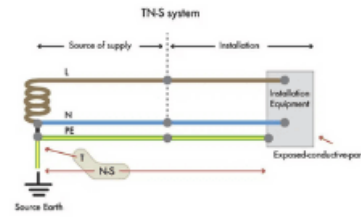
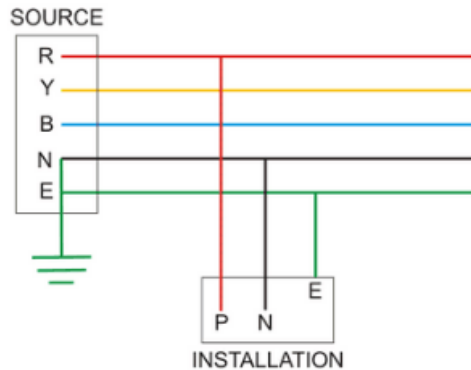
### TYPES OF EARTHING:

Broadly speaking ,the earthing of electrical equipments and lines are classified into two types: **system earthing** and **equipment earthing**.

#### 1.system Earthing:

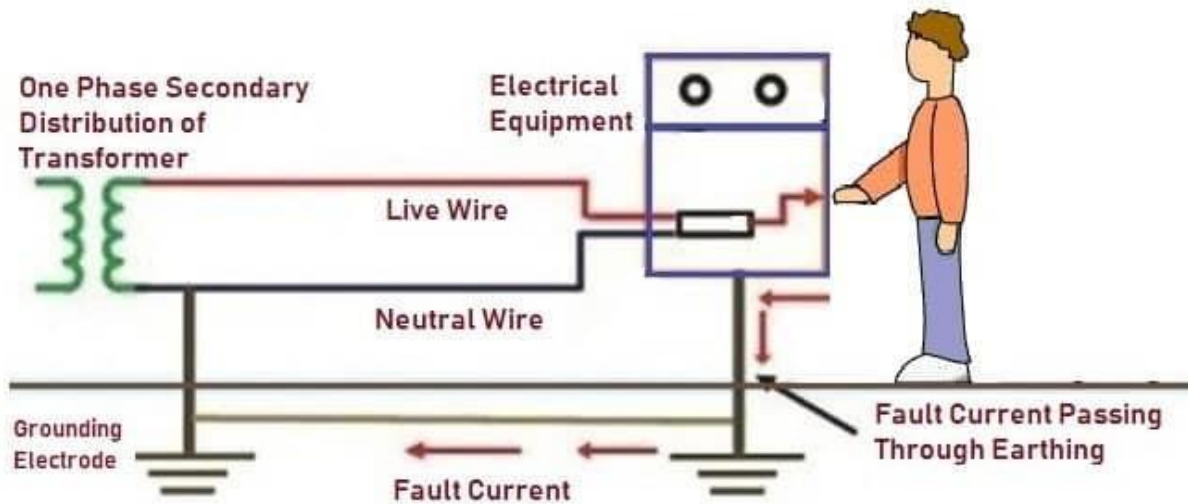
This is the type of earthing which is associated with current carrying conductors. It is quite relevant because there might be overflows of

# What is System Earthing?



currents during the process of its transmission. This type of earthing is put to use in stations and substations of electrical supply.

2. Equipment Earthing: This is the prime type of earthing for homes and other buildings .It deals with the safe guarding of non current carrying apparatus and metallic conductors. This type of earthing serves the dual function of protecting the user of the appliance against shocks, while at the same time safeguarding the appliance from getting harmed.



## Methods of earthing

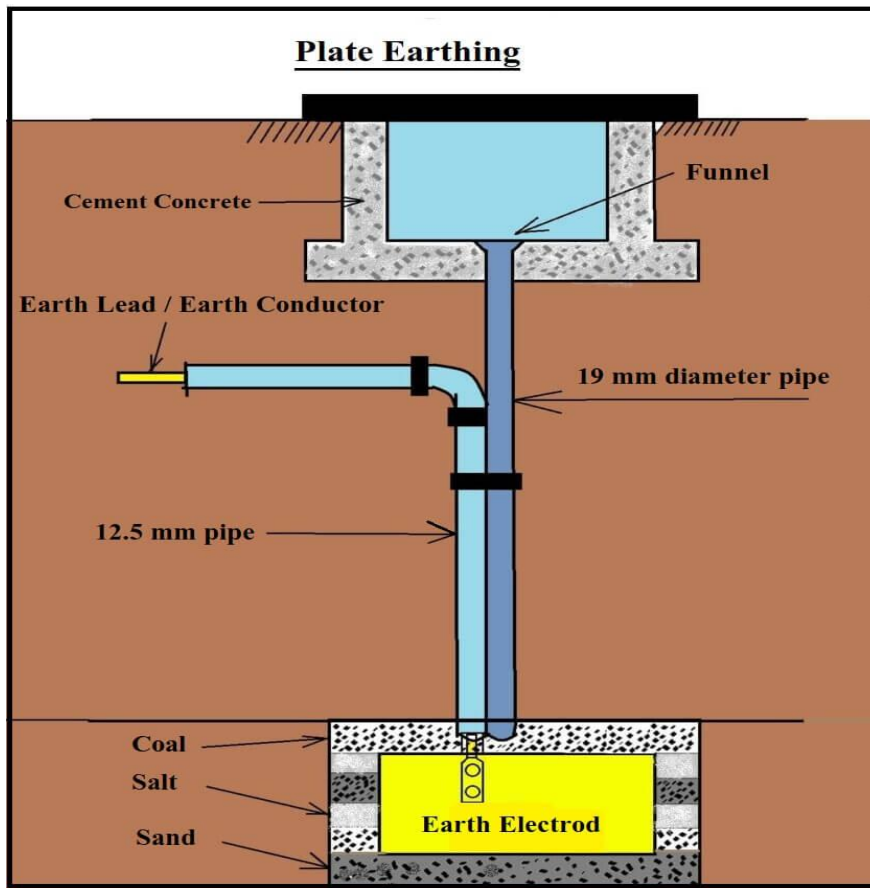
- ❖ There are several common methods employed for earthing of appliances and each of them is used according to the site of the building, the type and number of appliances to be earthed, the budget and other such factors. Here are a few of them

### 1.plate earthing

- This is the best earthing. A 2.5 metre deep pit is dug into the ground and a galvanised Iron (GI) plate is placed inside along with charcoal and sand for the purpose of maintain low resistance around the plate.

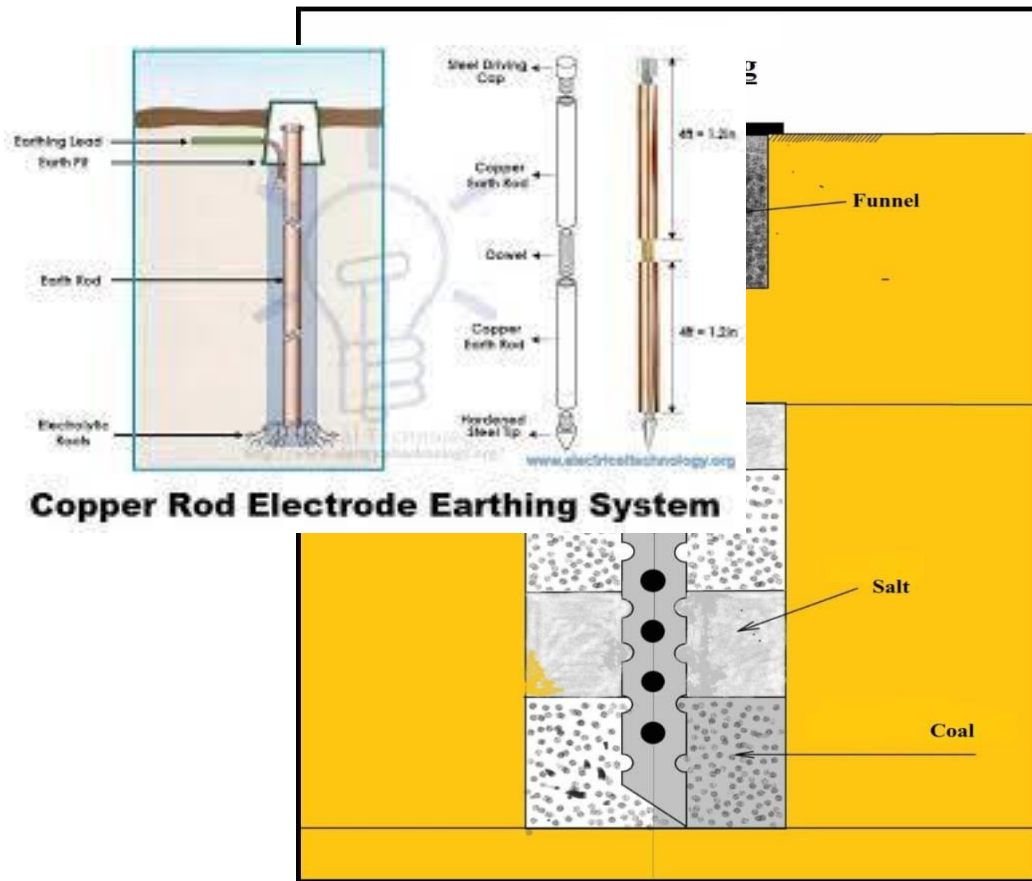
- 1.Pipe earthing
- 2.Rod earthing
- 3.earthing through water pipe

**1. Pipe earthing:** An earth wire, which is of GI or tinned copper, is blotted to the plate before burying it by means of nuts, bolts and washers. The wire is made to pass through a GI pipe through which some water is poured in to increase conductivity. The earth wire is connected to the earth point of the socket and is finally covered.



**2. Pipe earthing:** A 2.5 metre long pipe measuring about 35-75mm in diameter is buried in the dig out pit along with sand and charcoal. The pipe is provided with several perforations to maintain dampness around and hence conductivity. The earth wire is tied and clamped near the summit . Water may be poured into it during summers. The earth wire is safer against damage in such a setup.

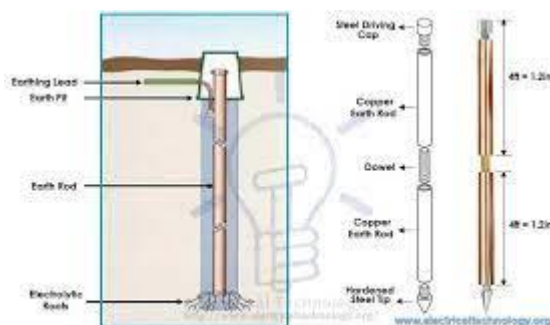




**Copper Rod Electrode Earthing System**

**3. Rod earthing:** This method employs hammering of Zinc and Copper rods of about 1-1.5 metres length and 12-20mm diameter into the general mass of the earth successive rods are screwed together and this chain is tried making as long as possible for lowered resistance by the surrounding soil.

The earth wire is tied and clamped near the summit. This is a very economical and quick. Procedure for earthing.



**Copper Rod Electrode Earthing System**

4. earthing through a water pipe: We know that hand pumps are used to extract water from the water bed, which lies well inside the ground. To the GI pipe of a hand pump the earth wire is tied and clamped the pipe serves as an excellent electrode for carrying excessive currents deep below the ground. However, the difficulty lies in the probable shocks to users of hand pumps if the earth wire is not clamped tight enough.

Submitted by

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