

Module-4b Domestic wiring

Structure

- Objective
- Introduction
- Service mains, meter board and distribution board.
- Brief discussion on concealed conduit wiring.
- Two-way and three-way control.
- Elementary discussion on Circuit protective devices: fuse and Miniature Circuit Breaker (MCB's).
- Electric shock, precautions against shock , earthing
- Elementary discussion on Circuit protective devices: fuse and Miniature Circuit Breaker (MCB's).
- Earth leakage circuit breaker (ELCB) and Residual current circuit breaker (RCCB).
- Outcomes
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Objective

- To gain knowledge on electrical distribution system at the consumer premises
- Controlling of switches
- Protective devices and its necessity
- To gain knowledge on electric shock and precautions to be taken to it.

Introduction

A network of wires drawn connecting the meter board to the various energy consuming loads (lamps, fans, motors etc) through control and protective devices for efficient distribution of power is known as electrical wiring. Electrical wiring done in residential and commercial buildings to provide power for lights, fans, pumps and other domestic appliances is known as domestic wiring. There are several wiring systems in practice.

Brief discussion on wiring

Types of wiring: Depending upon the above factors various types of wiring used in practice are:

1. Cleat wiring
2. Casing wiring
3. Surface wiring
4. Conduit wiring

i) Cleat wiring:

In this type V.I.R or P.V.C wires are clamped between porcelain cleats.

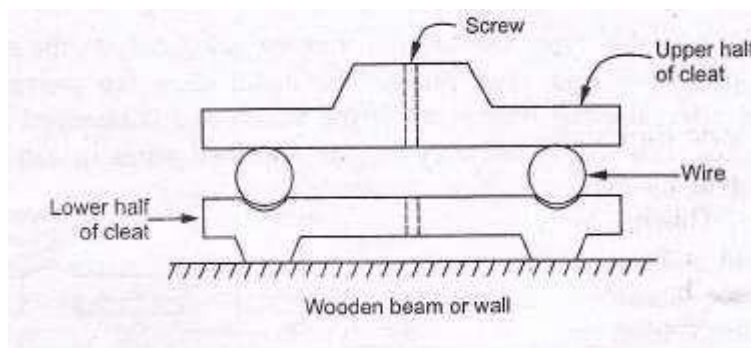


Fig.6.1: Cleat Wiring

The cleats are made up of two halves. One half is grooved through which wire passes while the other fits over the first. The whole assembly is then mounted on the wall or wooden beam with the help of screws.

This method is one of the cheapest method and most suitable for temporary work. It can be very quickly installed and can be recovered without any damage of material. Inspection and changes can be made very easily.

This method does not give attractive appearance. After some time due to sagging at some places, it looks shabby. Dust and dirt collects on the cleats. The wires are directly exposed to atmospheric conditions like moisture, chemical fumes etc. maintenance cost is very high.

Due to these disadvantages this type is not suitable for permanent jobs.

ii) Casing capping: This is very popularly used for residential buildings. In this method, casing is a rectangular strip made from teak wood or new a day's made up of P.V.C. It has two grooves into which the wires are laid. Then casing is covered with a rectangular strip of wood or

of the same width, called capping. The capping is screwed into casing is fixed to the walls the help or porcelain discs or cleats.

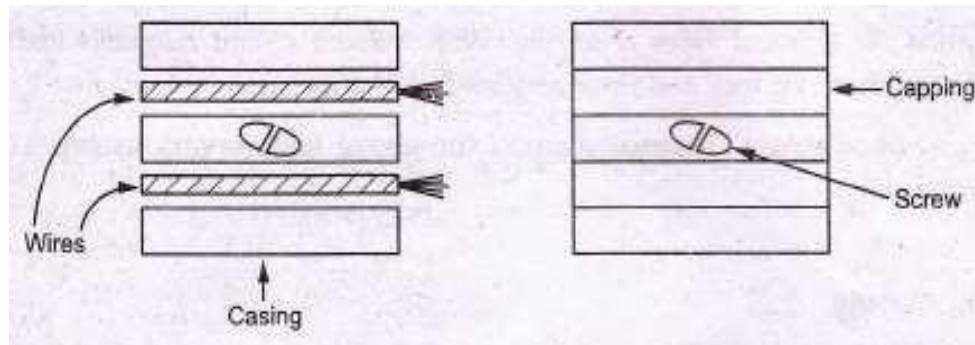


Fig.6.2: Casing and Capping

Good protection to the conductors from dangerous atmospheric conditions, neat and clean appearance are the advantages of this type.

In case of wooden casing capping, there is high risk of fire along with the requirement of skilled labour. The method is costly

iii Surface wiring: in this type, the wooden battens are fixed on the surface of the wall, by means of screws and rawl plugs. The metal clips are provided with the battens at regular intervals. The wire runs on the batten and is clamped on the batten using the metal clips. The wires used may lead sheathed wires or can tyre sheathed wires. Depending upon type of wire used surface wiring is also called lead sheathed wiring or cab tyre sheathed wiring. If the wire used is though rubber Sheathed then it is called T.R.S. wiring while if the wire used is cab tyre Sheathed Then it is called C.T.S wiring.

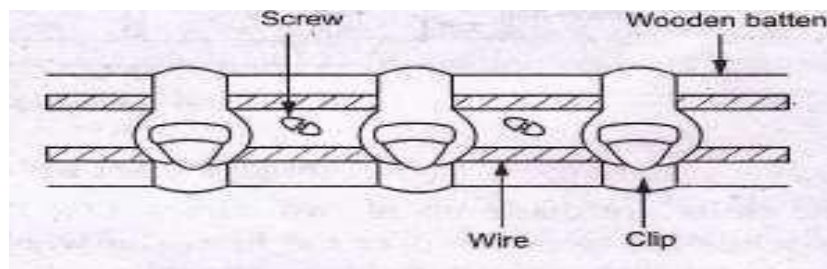


Fig.6.3: Wooden batten Wiring

iv Conduit wiring: In this method, metallic tubes called as conduits are used to run the wires. This is the best system of wiring as it gives full mechanical protection to the wires. This is most desirable

for workshops and public Buildings. Depending on whether the conduits are laid inside the walls or supported on the walls, there are two types of conduit wiring which are :

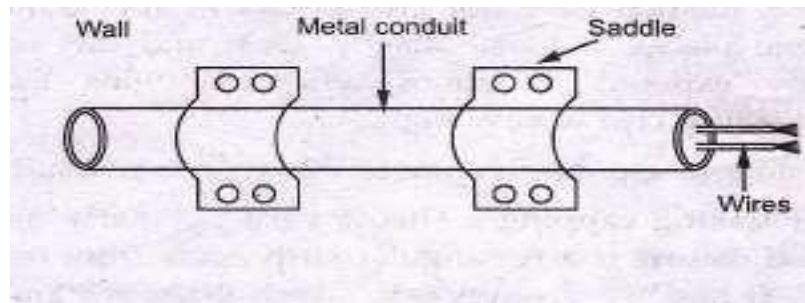


Fig.6.4: Surface Conduit Wiring

i) **Surface conduit wiring:** in this method conduits are mounted or supported on the walls with the help of pipe books or saddles. In damp situations, the conduits are spaced apart from the wall by means of wooden blocks.

ii) **Concealed conduit wiring:** In this method, the conduit are buried under the wall at the some of plastering. This is also called recessed conduit wiring.

The beauty of the premises is maintained due to conduit wiring. It is durable and has long life. It protects the wires from mechanical shocks and fire hazards. Proper earthing of conduits makes the method electrical shock proof. It requires very less maintenance.

The repairs are very difficult in case of concealed conduit wiring. This method is most costly and erection requires highly skilled labour. These are few disadvantages of the conduit type of wiring. In concealed conduit wiring, keeping conduit at earth potential is **must**.

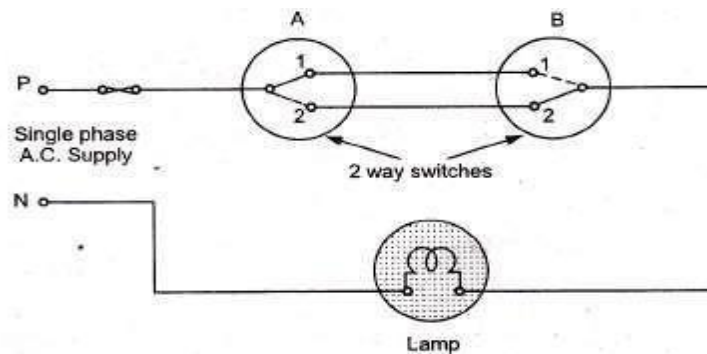


Fig. 6.5: Control of One lamp with two switches

Two- way and Three- way Control of Lamps:

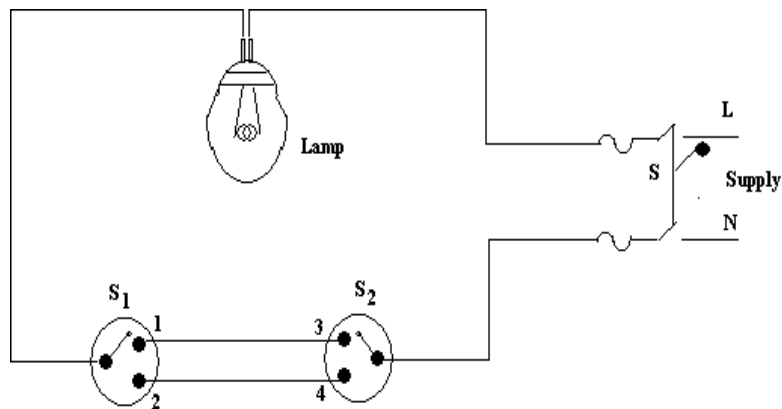
The domestic lighting circuits are quite simple and they are usually controlled from one point. But

in certain cases it might be necessary to control a single lamp from more than one point (Two or Three different points).

For example: staircases, long corridors, large halls etc.

Two-way Control of lamp:

Two-way control is usually used for staircase lighting. The lamp can be controlled from two different points: one at the top and the other at the bottom - using two- way switches which strap wires interconnect. They are also used in bedrooms, big halls and large corridors. The circuit is shown in the following figure.



Two -way control of lamp

Switches **S1** and **S2** are two-way switches with a pair of terminals 1&2, and 3&4 respectively. When the switch **S1** is in position **1** and switch **S2** is in position **4**, the circuit does not form a closed loop and there is no path for the current to flow and hence the lamp will be **OFF**. When **S1** is changed to position **2** the circuit gets completed and hence the lamp glows or is **ON**. Now if **S2** is changed to position **3** with **S1** at position **2** the circuit continuity is broken and the lamp is off. Thus the lamp can be controlled from two different points.

Position of S1	Position of S2	Condition of lamp
1	3	ON
1	4	OFF

2	3	OFF
2	4	ON

Three- way Control of lamp:

In case of very long corridors it may be necessary to control the lamp from 3 different points. In such cases, the circuit connection requires two; two-way switches **S1** and **S2** and an intermediate switch **S6**. An intermediate switch is a combination of two, two way switches coupled together. It has 4 terminals ABCD. It can be connected in two ways

- a) Straight connection
- b) Cross connection

In case of straight connection, the terminals or points AB and CD are connected as shown in figure 1(a) while in case of cross connection, the terminals AB and C D is connected as shown in figure 1(b). As explained in two –way control the lamp is ON if the circuit is complete and is OFF if the circuit does not form a closed loop.

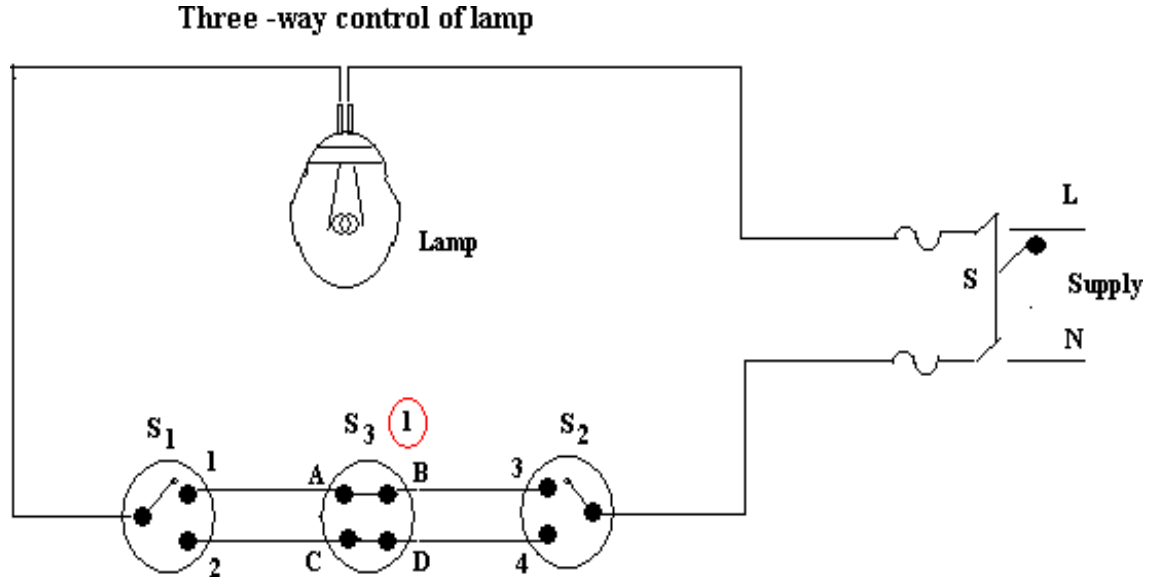


Figure 1 (a) Straight connection

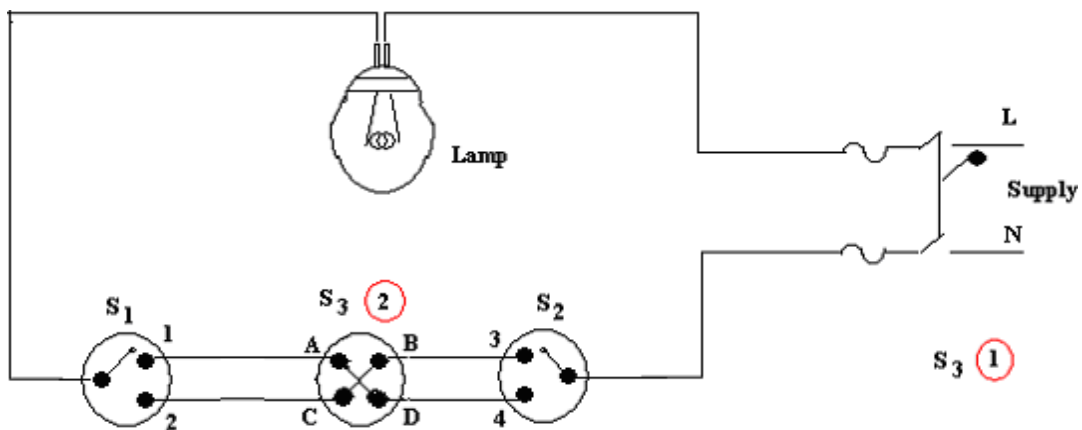


Figure 1 (b) Cross connection

The condition of the lamp is given in the table depending on the positions of the switches **S1**, **S2** and **S6**.