Experiment No. 1 Name of experiment:

Controlling two lamps in series and parallel via one way switch.

1. **Objective:** To control two lamp (bulb) in parallel and in series with one switch. This circuit is done to understand characteristic series and parallel connection.

2. Theory:

What are a parallel and series circuit diagram?

In a parallel circuit, all components are connected across each other, forming exactly two sets of electrically common points. A "branch" in a parallel circuit is a path for electric current formed by one of the load components (such as a resistor).

In a series circuit, the components are arranged in a line, one after the other. Take a look at the diagram below: The schematic drawing is a better way to draw a series circuit. Each time there is damage (break) in any one of the resistors the entire circuit will not function.

Lamps in Series If several lamps are connected in series they will all be switched on and off together by a switch connected anywhere in the circuit. The supply voltage is divided equally between the lamps (assuming they are all identical.



Electric Eng. Dep.

Symbol and legend

3. Procedure:

- 1. Draw the circuit diagram and get them approved by staff in charge. Prepare the list of tools and material required for the work and collect them.
- 2. Cut the commenting wires length suitable length make connection according to the circuit diagram.
- 3. In parallel circuit Voltage remains the across the two bulbs (resistances) but current varies. Overall resistance in parallel circuit is smaller than the individual resistance in the circuit.
- 4. Live (line) terminal of the source is connected with the switch and one wire is connected with the second poilt of switch and with the bulb. Two bulbs are connected in parallel as show in figure. The neutral terminal is then connected with other point of the 2nd bulb to make a complete circuit.
- 5. The circuit is then checked by providing the AC supply to the circuit and shown to the Supervisor.

Report:

- 1. What happens if one bulb burns out in a series circuit?
- 2. Does it matter which wire goes where on a lamp?
- 3. What happens in a parallel circuit if one light bulb is removed?
- 4. What happens to brightness of bulbs in series?
- 5. Why does brightness decrease in series?
- 6. What happens to the brightness of bulbs in a parallel circuit?
- 7. Which bulb glows brighter in parallel?



Electric Eng. Dep.



Electric Eng. Dep.

Extra symbol and legend 1



Extra symbol and legend 2

Electric Eng. Dep.

Experiment No. 2

Name of experiment:

Controlling a light with two or more switches via two way switch and intermediate switch.

- 4. **Objective:** installing the electrical zone including:
 - 1) the socket
 - 2) control one lamp with two switchs and
 - 3) bell controling with NC bush boton.
 - 4) Circuit breaker MCB.

5. Theory:

A light or lights can be controlled by more than one switch. The usual practice in home construction is to use 3-way switches. "3-way" is the electrician's designation for a single pole double throw (SPDT) switch. The switches must create a complete circuit for current to flow and the bulb to light.



Construction & Working of a 2-Way Switch

Two Way switch is also known as Single Pole Double Through (SPDT). The basic construction and working principle of 2-way switch is illustrated in (fig) below.



How to Wire a 2-Way Switch

Below is a given schematic wiring diagram (fig 2) that shows how to wire a 2-way switch and control a light bulb from two different places.



6. Procedure:

- 6. Draw the circuit diagram and get them approved by staff in charge. Prepare the list of tools and material required for the work and collect them.
- 7. Cut the commenting wires length suitable length make connection according to the circuit diagram.
- 8. Live (line) terminal of the source is connected with the switch and one wire is connected with the second poilt of switch and with the bulb. The circuit show in figure. The neutral terminal is then connected with other point of the bulb to make a complete circuit.
- 9. Neutral (N) terminal of the source is connected with the bush boton and one wire is connected with the second poilt of bush boton and with the bell.
- 10. The circuit is then checked by providing the AC supply to the circuit and shown to the Supervisor.

• Required Components

- Two 2-way switches
- Bulb
- AC supply
- Connecting wires
- Socket
- Bush button
- Electrical bell
- Circuit breaker
- •





Report:

- 8. What's the difference between 1 way and 2 way light switches?
- 9. What the function of the two way switch?
- 10. How do you control a light with three locations?
- 11. Why Neutral (N) terminal of the source is connected with the bush button and then from bush button to the bell?

Experiment No. 3

Name of experiment:

Wiring KW/H meter, MCB (Miniature Circuit Breaker) and RCD (Residual Current Device)

- 7. Objective: Electrical Wiring Installation of the Distribution Board (Single Phase Home Supply from Utility Pole & Energy Meter to the Consumer Unit):
 - Wiring a Distribution Board.
 - Requirement to Wire a Single Phase Distribution Board •
 - DP = Double Pole MCB (The Main Switch) •
 - (CB) Circuit Breakers (SP) •
 - RCD (Residual Current Device)

8. Theory:

Energy Meter: Definition: The meter which is used for measuring the energy utilizes by the electric load is known as the energy meter. The energy is the total power consumed and utilized by the load at a particular interval of time. It is used in domestic and industrial AC circuit for measuring the power consumption. The meter is less expensive and accurate.

Construction of Energy Meter

The construction of the single phase energy meter is shown in the figure below.



The energy meter has four main parts. They are the

- 1. Driving System
- 2. Moving System
- 3. Braking System
- 4. Registering System

Classic control

Electric Eng. Dep.

1. Driving System – The electromagnet is the main component of the driving system. It is the temporary magnet which is excited by the current flow through their coil. The core of the electromagnet is made up of silicon steel lamination. The driving system has two electromagnets. The upper one is called the shunt electromagnet, and the lower one is called series electromagnet.

The series electromagnet is excited by the load current flow through the current coil. The coil of the shunt electromagnet is directly connected with the supply and hence carry the current proportional to the shunt voltage. This coil is called the pressure coil.

The centre limb of the magnet has the copper band. These bands are adjustable. The main function of the copper band is to align the flux produced by the shunt magnet in such a way that it is exactly perpendicular to the supplied voltage.

2. Moving System – The moving system is the aluminium disc mounted on the shaft of the alloy. The disc is placed in the air gap of the two electromagnets. The eddy current is induced in the disc because of the change of the magnetic field. This eddy current is cut by the magnetic flux. The interaction of the flux and the disc induces the deflecting torque.

When the devices consume power, the aluminium disc starts rotating, and after some number of rotations, the disc displays the unit used by the load. The number of rotations of the disc is counted at particular interval of time. The disc measured the power consumption in kilowatt hours.

3. Braking system – The permanent magnet is used for reducing the rotation of the aluminium disc. The aluminium disc induces the eddy current because of their rotation. The eddy current cut the magnetic flux of the permanent magnet and hence produces the braking torque.

This braking torque opposes the movement of the disc, thus reduces their speed. The permanent magnet is adjustable due to which the braking torque is also adjusted by shifting the magnet to the other radial position.

4. Registration (Counting Mechanism) – The main function of the registration or counting mechanism is to record the number of rotations of the aluminium disc. Their rotation is directly proportional to the energy consumed by the loads in the kilowatt hour.

The rotation of the disc is transmitted to the pointers of the different dial for recording the different readings. The reading in kWh is obtained by multiply the number of rotations of the disc with the meter constant. The figure of the dial is shown below.

