BEE Experiments Record.

6. TYPES OF WIRING (FLUORESCENT LAMP WIRING, STAIRCASE WIRING).

☆ PRE-LAB QUESTIONS ⟹

① How does fluorescent lamp work?

→ Fluorescent lamps work by ionizing mercury vapor in a glass tube. This causes electrons in the gas to emit photons at UV frequencies. The UV light is converted into standard visible light using a phosphor coating on the inside of the tube.

② What are the advantages of fluorescent light bulbs?

→ Fluorescent lamps do not produce as much heat as traditional lighting options. They make about 75% less heat compared to an incandescent bulb because they are not using resistance to emit light. That also results in an energy savings and also helps to keep whatever room they are in at a cooler temperature.

③ What is the voltage required to start a fluorescent lamp?

→ Fluorescent lamps and electroluminescent panels typically require 200 to 600V for starting and running illumination. A fluorescent light is a type of gas discharge tube, which contains an inert gas (such as argon, neon or krypton) and mercury vapor.

④ What is the function of starter in fluorescent lamp?

→ Starters are used in fluorescent lamps for starting purposes and are commonly known as starters. Starter has two bimetallic electrodes enclosed in a small glass tube containing helium gas. These electrodes normally remain open.

⑤ What is the difference between fluorescent lamp and incandescent lamp?

→

	PARAMETERS	FLUORESCENT BULB	INCANDESCENT BULB
1.	Longevity	Usually 6,000 to 15,000 hours.	2000 hours.
2.	How they work	Fluorescent bulbs generate light by sending an electrical discharge through an ionized gas.	Incandescent light is emitted by heating the filament present in the bulb.
3.	Materials used	Argon, mercury vapor, tungsten, barium, strontium and calcium oxeides.	Argon, tungsten and filaments.
4.	Types	Tanning bulbs, growth bulbs, bilirubin bulb, germicidal bulb	Clear, frosted, decorative.
5.	Power factor	Low	High

6.	Operating Temperature	Low	High
7.	Aging effect	Less	More

(A) FLUORESCENT LAMP WIRING.

☆ AIM ⟹

To make connections of a fluorescent lamp wiring and to study the accessories of the same.

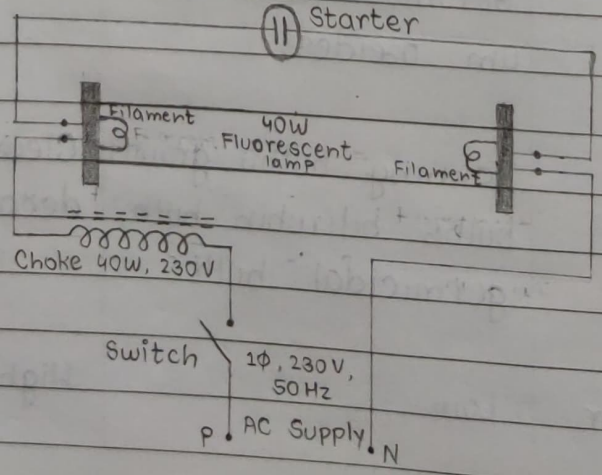
☆ APPARATUS REQUIRED ⟹

1) Fluorescent Lamp fixture = 4 Ft ⟶ 1
2) Fluorescent Lamp = 40 W ⟶ 1
3) Choke = 40 W, 230 V ⟶ 1
4) Starter = - ⟶ 1
5) Connecting wires = - ⟶ As req.

☆ TOOLS REQUIRED ⟹

1) Wireman's tool kit ⟶ 1

☆ CIRCUIT DIAGRAM ⟹



☆ RESULT ⟹

The connections of a Fluorescent lamp wiring are made and the accessories of the same are studied.

⑧ STAIRCASE WIRING.

☆ AIM ⟹

To control a single lamp from two different places.

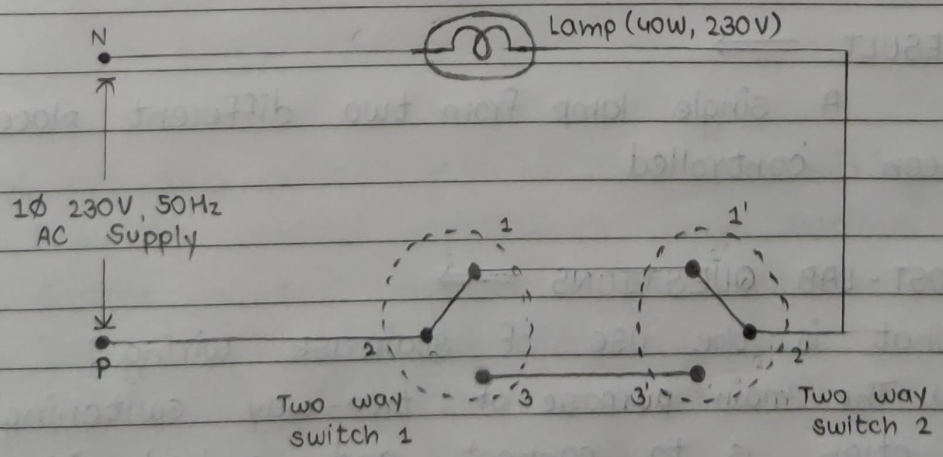
☆ APPARATUS REQUIRED ⟹

1) Incandescent Lamp = (40W, 230V) ⟶ 1
2) Lamp Holder = - ⟶ 1
3) Two-way switches = (5A, 230V) ⟶ 2
4) Connecting wires = - ⟶ As required

☆ TOOLS REQUIRED ⟹

1) Wireman's tool kit ⟶ 1

☆ CIRCUIT DIAGRAM ⟹



☆ TABULAR COLUMN ⟹

1) Direct Connection.

Position of Switches		Condition of lamp
S1	S2	
OFF	OFF	ON
OFF	ON	OFF
ON	OFF	OFF
ON	ON	ON

2) Cross Connection.

Position of Switches		Condition of lamp
S1	S2	
OFF	OFF	OFF
OFF	ON	ON
ON	OFF	ON
ON	ON	OFF

☆ RESULT ⟹

A single lamp from two different places has been controlled.

☆ POST-LAB QUESTIONS ⟹

① What is the use of staircase wiring?

→ 1) The main purpose of two-way switching connection is to connect and control AC appliances and equipments from two seperate locations.

2) It is mostly used in staircase wiring where a light bulb can be control (Switch ON / Switch OFF) from different places, no matter you are in upper or lower portion of stair. Also, it does not depend on the switches position as well.

② Why choke is used in fluorescent lamp?

→ 1) The purpose of the choke is to provide a very-high voltage initially between the filaments (across the ends of lamp). Again, once the gas in the tube is ionized, the choke provides a low voltage. A choke is a coil of wire.

③ What is the purpose of magnetic ballast in fluorescent lamp?

→ 1) The magnetic ballast uses a magnetic transformer of copper windings around a steel core to convert the input line voltage and current to the voltage and current required to start and operate the fluorescent lamps.

2) Capacitors are added to assist lamp starting and power factor correction.

④ List out the advantages of staircase wiring.

→ 1) Easy to control appliances from various points.
2) Faster control than a single switch.
3) Highly efficient for larger places.
4) Living comfort can be increased.
5) Electricity can be saved.

⑤ Compare electronic ballast and magnetic ballast.

→ 1) Electronic ballast change the frequency of the current without any change in the voltage.

2) Magnetic ballasts work at a Frequency of around 60 Hz, whereas electronic ballasts work at an increased frequency of around 20,000 Hz. That is why fluorescent lamps using electronic ballasts do not flicker or emit any buzzing sounds.

3) Electronic ballasts are also quite smaller in size and weight. They are much more energy efficient as compared to magnetic ballasts.

4) Electronic ballasts can be used for lamps that are connected in parallel or series. In this series, if any single lamp goes out, it will not affect the performance of other lamps using the same ballast.