

DEPT. OF ELECTRICAL & ELECTRONICS ENGINEERING
SRM INSTITUTE OF SCIENCE AND TECHNOLOGY, Kattankulathur – 603 203

Title of Experiment	: Types of wiring (a)Fluorescent Lamp wiring, (b) Stair case wiring
Name of the candidate	: GNANA SURYA TEJA
Register Number	: RA2011026010151
Date of Experiment	: 02-12-2020

Sl. No.	Marks Split up	Maximum marks (50)	Marks obtained
1	Pre Lab questions	5	
2	Preparation of observation	15	
3	Execution of experiment	15	
4	Calculation / Evaluation of Result	10	
5	Post Lab questions	5	
Total		50	

Staff Signature

PRE LAB QUESTIONS

1. How does fluorescent lamp work?

A fluorescent lamp, or fluorescent tube, is a low-pressure mercury-vapor gas-discharge lamp that uses fluorescence to produce visible light. An electric current in the gas excites mercury vapor, which produces short-wave ultraviolet light that then causes a phosphor coating on the inside of the lamp to glow.

2. What is the difference between fluorescent lamp and incandescent lamp?

When it comes to a traditional incandescent light bulb, electricity runs through a wire inside the bulb and heats it up. When it's hot enough, it glows. A fluorescent light bulb uses gas inside the bulb to light up: when electricity runs through it, it excites a mixture of gases, which are transformed into light.

3. What are the advantages of fluorescent light bulbs?

Energy efficient- so far the best light for interior lighting

Low production cost (of tubes, not of the ballasts)

Long life of tubes

Good selection of desired color temperature (cool whites to warm whites)

Diffused light (good for general, even lighting, reducing harsh shadows)

4. What is the voltage required to start a fluorescent lamp?

Fluorescent tubes and electroluminescent panels typically require 200 to **600 V** for starting and running illumination.

5. What is the function of starter in a fluorescent lamp?

Fluorescent starters or glow starters are used to help **fluorescent tubes** and **lamps** ignite in the initial starting stage of their operation. Simply put, **fluorescent** starters are a timed switch. The switch opens and closes until the **fluorescent tube** 'strikes' and **lights-up**.

Experiment No. a)

Date : 2/12/20

FLUORESCENT LAMP WIRING

Aim:

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

Apparatus Required:

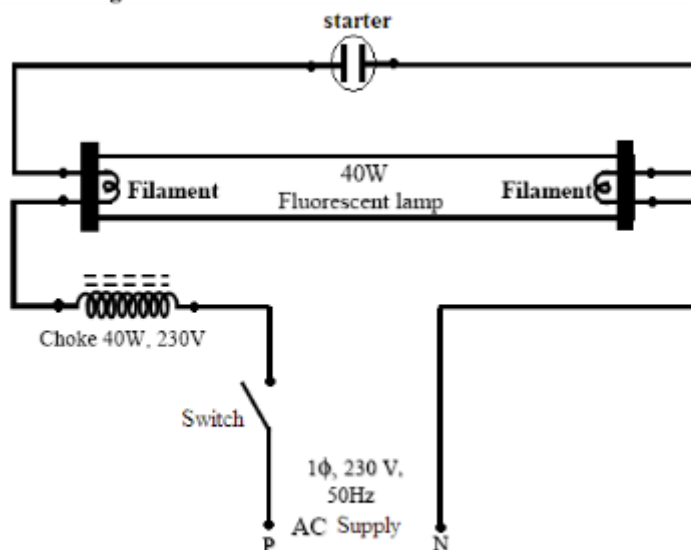
S.No	Components	Range/Type	Quality
1.	Fluorescent Lamp fixture	4 ft	1
2.	Fluorescent lamp	40W	1
3.	Choke	40W, 230V	1
4.	Starter	-	1
5.	Connecting wires	-	As required

Tools Required:

Wire man's tool Kit

- 1 No

Circuit diagram:



Theory:

1. The electrode of the starter which is enclosed in a gas bulb filled with argon gas, cause discharge in the argon gas with consequent heating.
2. Due to heating, the bimetallic strip bends and causes in the starter to close. After this, the choke, the filaments (tube ends) to tube and starter becomes connected in series.
3. When the current flows through the tube end filaments the heat is produced. During the process the discharge in the starter tube disappears and the contacts in the starter move apart.
4. When sudden break in the circuit occur due to moving apart of starter terminals, this causes a high value of e.m.f to be induced in the choke.
5. According to Lenz's law, the direction of induced e.m.f in the choke will try to oppose the fall of current in the circuit.
6. The voltage thus acting across the tube ends will be high enough to cause a discharge to occur in the gas inside the tube. Thus the tube starts giving light.
7. The fluorescent lamp is a low pressure mercury lamp and is a long evacuated tube. It contains a small amount of mercury and argon gas at 2.5 mm pressure. At the time of switching in the tube, mercury is in the form of small drops. Therefore, to start the tube, filling up of argon gas is necessary. So, in the beginning, argon gas starts burning at the ends of the tube; the mercury is heated and controls the current and the tube starts giving light. At each end of the tube, there is a tungsten electrode which is coated with fast electron emitting material. Inside of the tube is coated with phosphor according to the type of light.
8. A starter helps to start the start the tube and break the circuit.
9. The choke coil is also called blast. It has a laminated core over which enameled wire is wound. The function of the choke is to increase the voltage to almost 1000V at the time of switching on the tube and when the tube starts working, it reduces the voltage across the tube and keeps the current constant.

Procedure

1. Give the connections as per the circuit diagram.
2. Fix the tube holder and the choke in the tube.
3. The phase wire is connected to the choke and neutral directly to the tube
4. Connect the starter in series with the tube.
5. Switch on the supply and check the fluorescent lamp lighting.

CIRCUIT DIAGRAM:

Result

Experiment No. 7
Date : 2/12/2020
Name: Shashank
Kumar

b) STAIRCASE WIRING

Aim:

To control a single lamp from two different places.

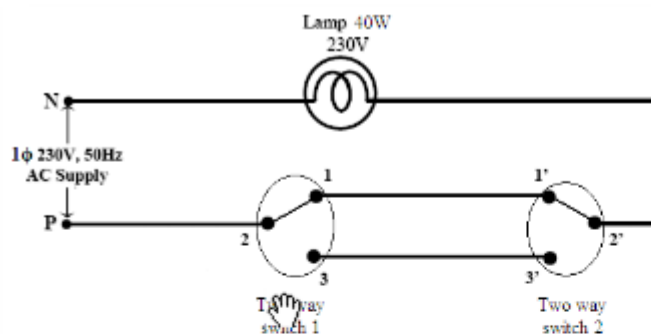
Apparatus Required:

S.No	Components	Quantity/ Range
1	Incandescent Lamp	1 (230V, 40W)
2	Lamp holder	1
3	Two way switches	2 (230V, 5A)
4	Connecting Wires	As required

Tools Required:

Wire mans tool Kit - 1No.

Circuit Diagram:



Theory:

1. A two way switch is installed near the first step of the stairs. The other two way switch is installed at the upper part where the stair ends.
2. The light point is provided between first and last stair at an adequate location and height if the light is switched on by the lower switch. It can be switched off by the switch at the top or vice versa.
3. The circuit can be used at the places like bed room where the person may not have to travel for switching off the light to the place from where the light is switched on.
4. Two numbers of Two-way switches are used for the purpose. The supply is given to the switch at the short circuited terminals.
5. The connection to the light point is taken from the similar short circuited terminal of the second switch. Other two independent terminals of each circuit are connected through cables.

Procedure:

1. Give the connections as per the circuit diagram.
2. Verify the connections.
3. Switch on the supply.
4. Verify the conditions.

Tabulation:

Case 1: Parallel Connection

Position of switches		Condition of Lamp
S1	S2	
1	1	ON
1	2	OFF
2	1	OFF
2	2	ON

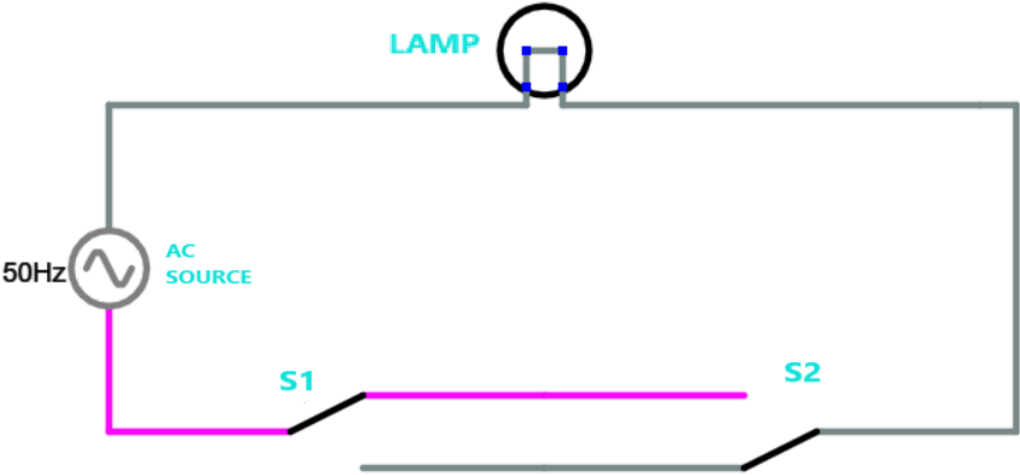
Case 2: Crossed Connection

Position of switches		Condition of Lamp
S1	S2	
1	1	OFF
1	2	ON
2	1	ON
2	2	OFF

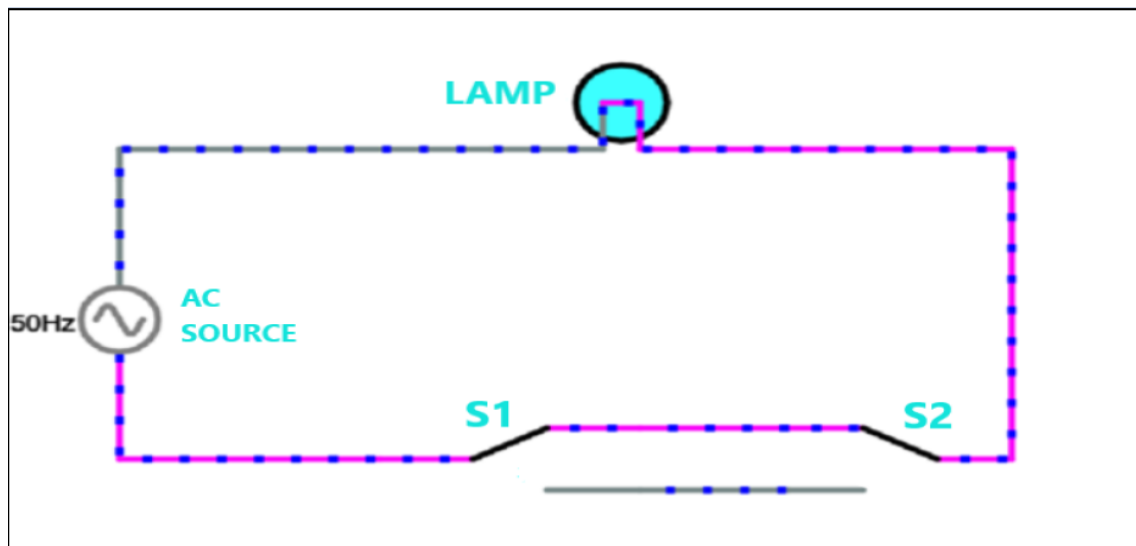
eCIRCUIT DIAGRAM:

CIRCUIT 1: PARALLEL CONNECTION

OFF:

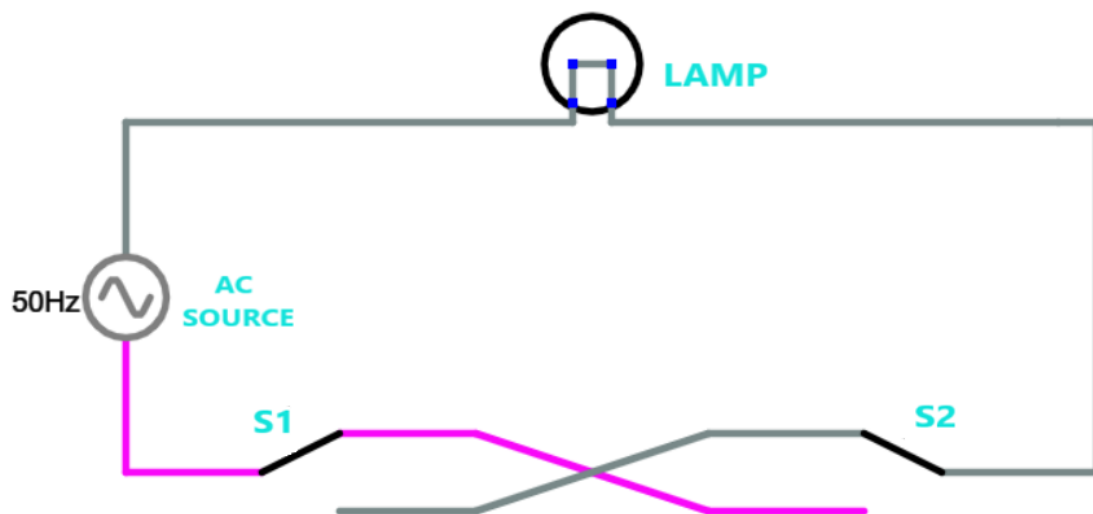


ON:

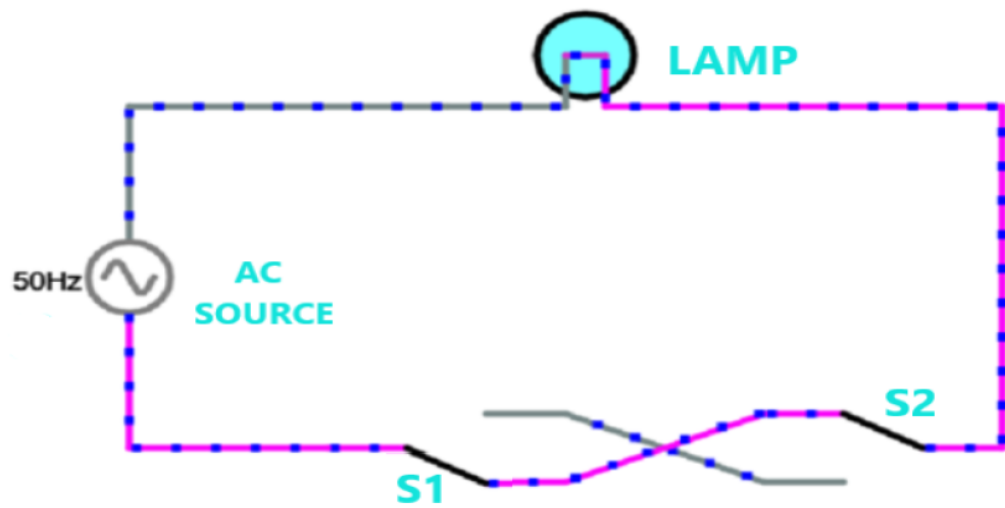


CIRCUIT 2: CROSSED CONNECTION

OFF:



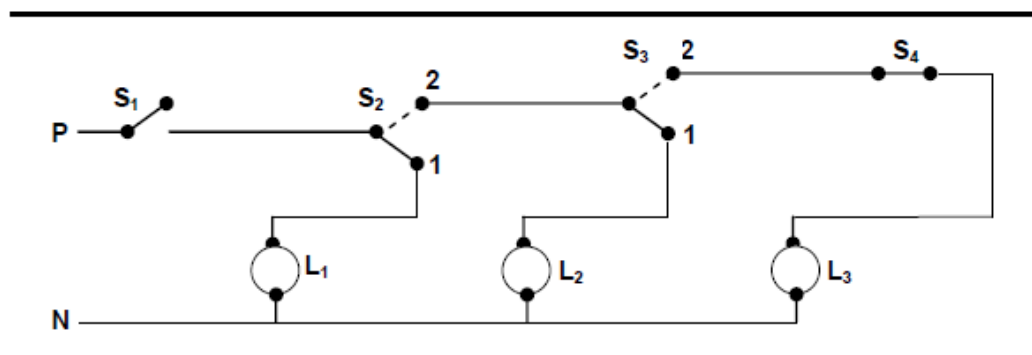
ON:



Result

The conditions of the staircase wiring have been verified using e-circuits and by taking correct observations.

CORRIDOR / GODOWN WIRING

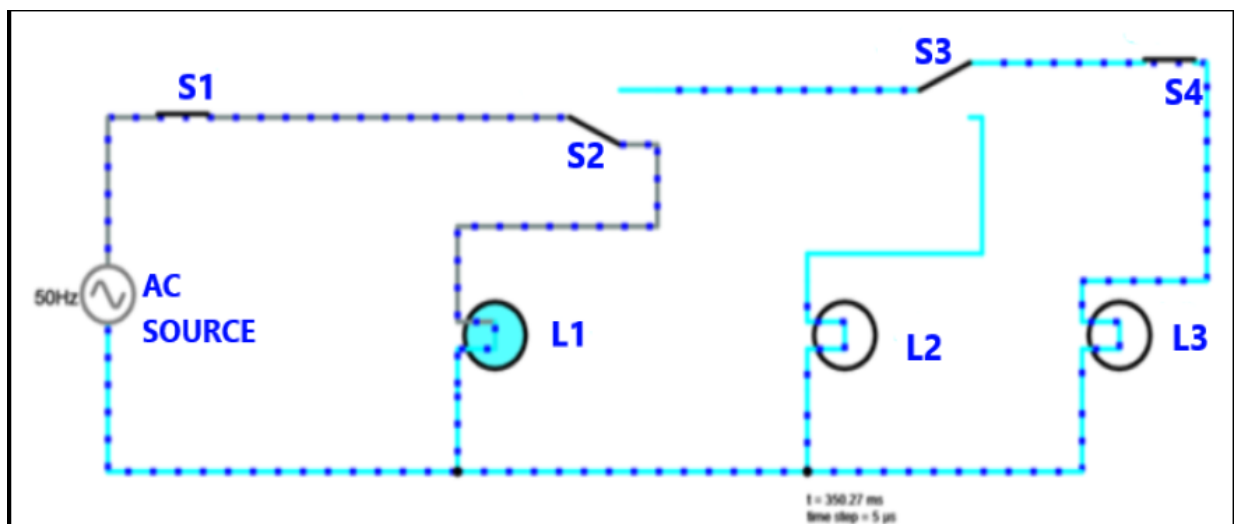


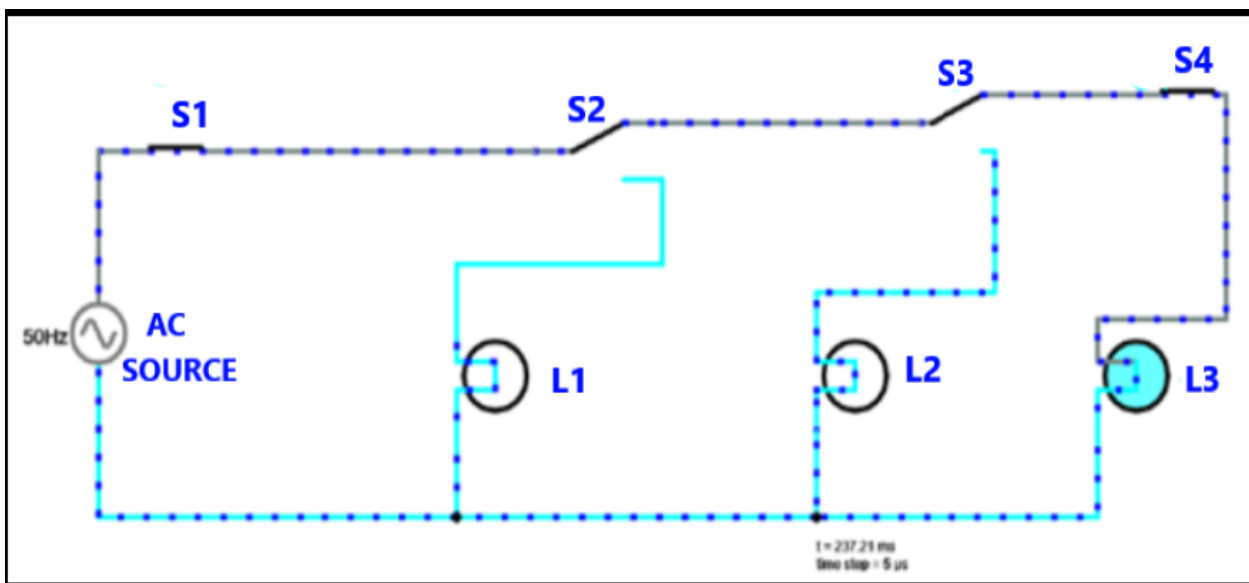
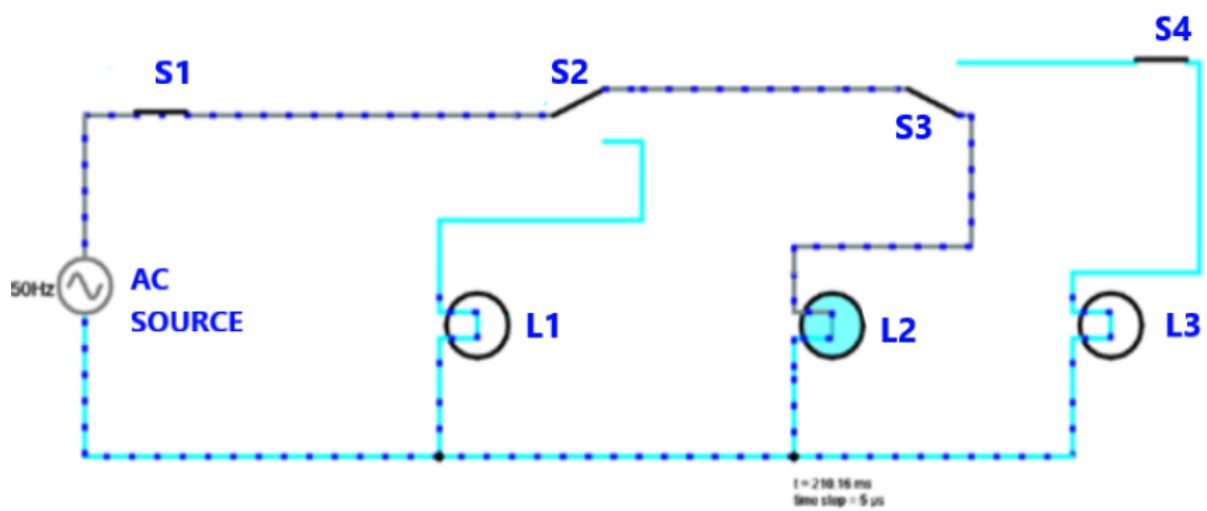
Moving from left to right:

Enters	Closes S_1	L_1 ON
Reaches S_2	Put S_2 to 2	L_1 OFF and L_2 ON
Reaches S_3	Put S_3 to 2	L_2 OFF and L_3 ON
Reaches S_4	Opens S_4	L_3 OFF

Moving from right to left:

Enters	Closes S_4	L_3 ON
Reaches S_3	Put S_3 to 1	L_2 ON and L_3 OFF
Reaches S_2	Put S_2 to 1	L_1 ON and L_2 OFF
Leaves	Opens S_1	L_1 OFF





POST LAB QUESTIONS

1. What is the use of staircase wiring?

Staircase wiring makes the feasibility for the user to turn ON and OFF the load from two different positions.

2. Why choke is used in fluorescent lamp?

The **choke** primarily serves to limit current flow to the correct level for the **tube**. It also can be **used** during startup to provide an inductive 'kick' forming a momentary higher-voltage pulse to start the **lamp**.

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

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

4. Compare electronic ballast and magnetic ballast?

Electronic Ballast	Magnetic Ballast
Electronic ballast controls the starting voltage and the operating currents of lighting devices. Electronic ballast usually operates with our A.C source of 220V, 50-60 Hz Frequency. The electronic ballast consists of a rectifier which converts the A.C input into D.C. output. The D.C. current thus obtained is filtered by capacitors. This filtered current is then passes through a series of induction coils and fed to a high frequency oscillator. Hence, the output current is at a very high frequency (around 20-80 kHz).	Magnetic ballast is actually an inductive coil. It actually looks like a transformer, a copper wire wound over a core material. Inductors are generally used to oppose a change in current passing through them.
The size and weight of this ballast is small and light.	They are bulkier in size as compared to electronic ballasts.
They are very energy efficient.	They are less energy efficient than electronic ballasts.
They work at a very high frequency but do not change the voltage.	They work at a frequency of 60Hz.

5.List out the advantage of staircase wiring

- A staircase wiring is a system where an appliance is connected to two, two-way switches so that it can be controlled from two different places. It was made so that turning the light of a staircase is more convenient. A person at the top and at the bottom can easily turn the light on and off.

Not only a light but also other appliances can be connected in a similar fashion and controlled at two different places.

This functionality not only provides more comfort and usability to the user but is also very efficient as it saves electricity.