

DEPT. OF ELECTRICAL & ELECTRONICS ENGINEERING

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY, Kattankulathur – 603 203

Title of Experiment	: 7. Types of wiring (a) Fluorescent Lamp wiring, (b) Stair case wiring
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Name of the candidate	: Jayant Pathak
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Register Number	: RA2011030010121
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Date of Experiment	: 18/11/20
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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?

Fluorescent lamps also 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.

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." A fluorescent light is a type of gas discharge tube, which contains an inert gas (such as argon, neon, or krypton) and mercury vapor.

5. What is the function of starter in a 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.

Experiment No. 7 a)**Date :****FLUORESCENT LAMP WIRING****Aim:**

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

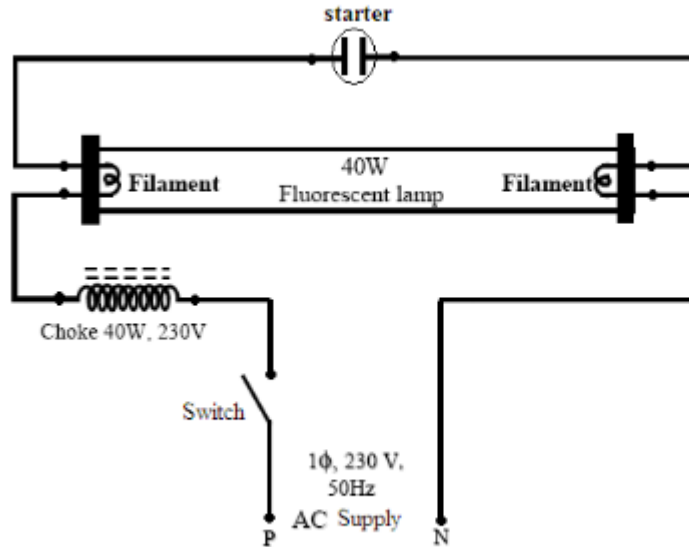
Apparatus Required:

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 tube and break the circuit.
9. The choke coil is also called ballast. 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.

Result: Hence fluorescent lamp wiring is verified.

Procedure:

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

Tabulation:

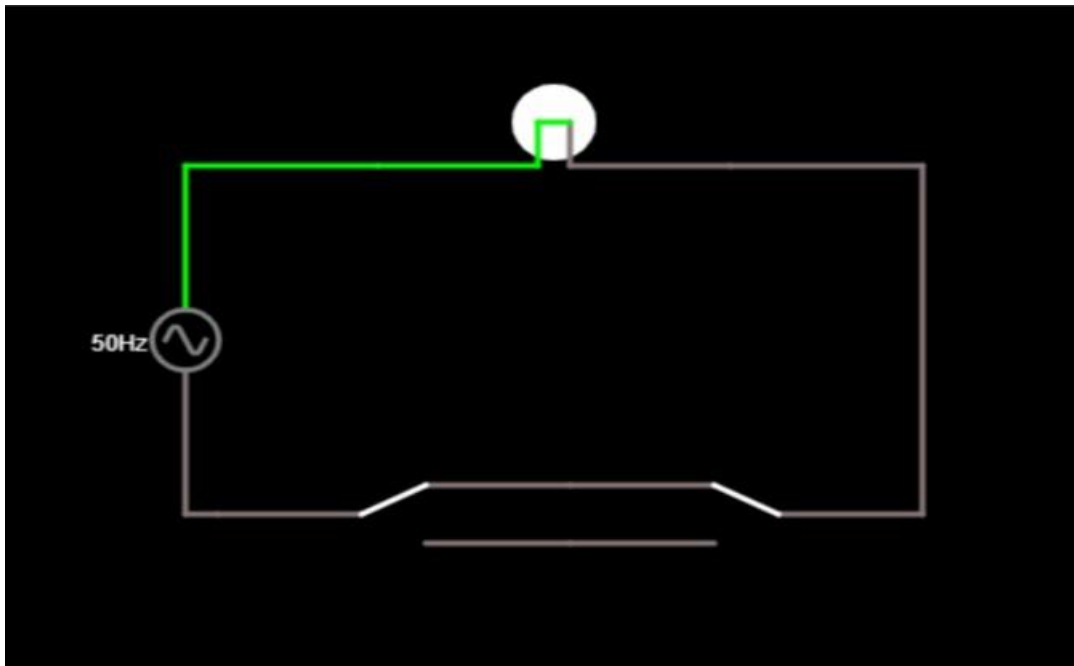
Position of switches		Condition of lamp
S1	S2	

TABULATION:

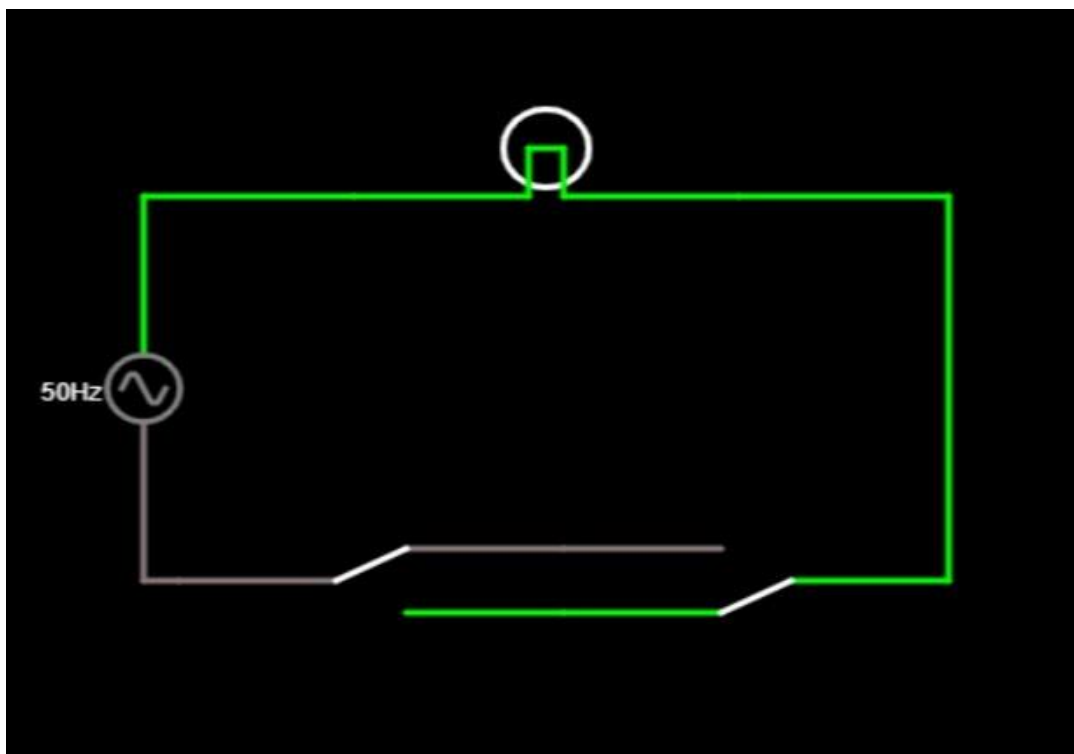
POSITION OF SWITCHES		CONDITION OF LAMP
S1	S2	
1	1'	GLOWS
1	3'	DOESN'T GLOWS
3	1'	DOESN'T GLOWS
3	3'	GLOWS

SIMULATION:

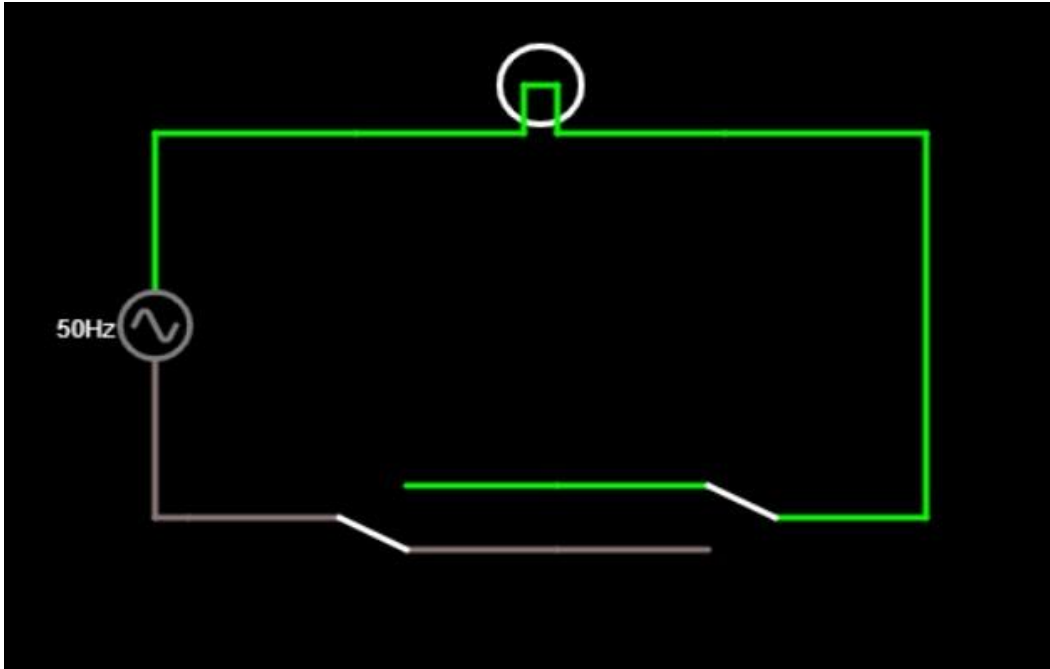
SWITCH S1 IN 1 AND S2 IN 1' POSITION



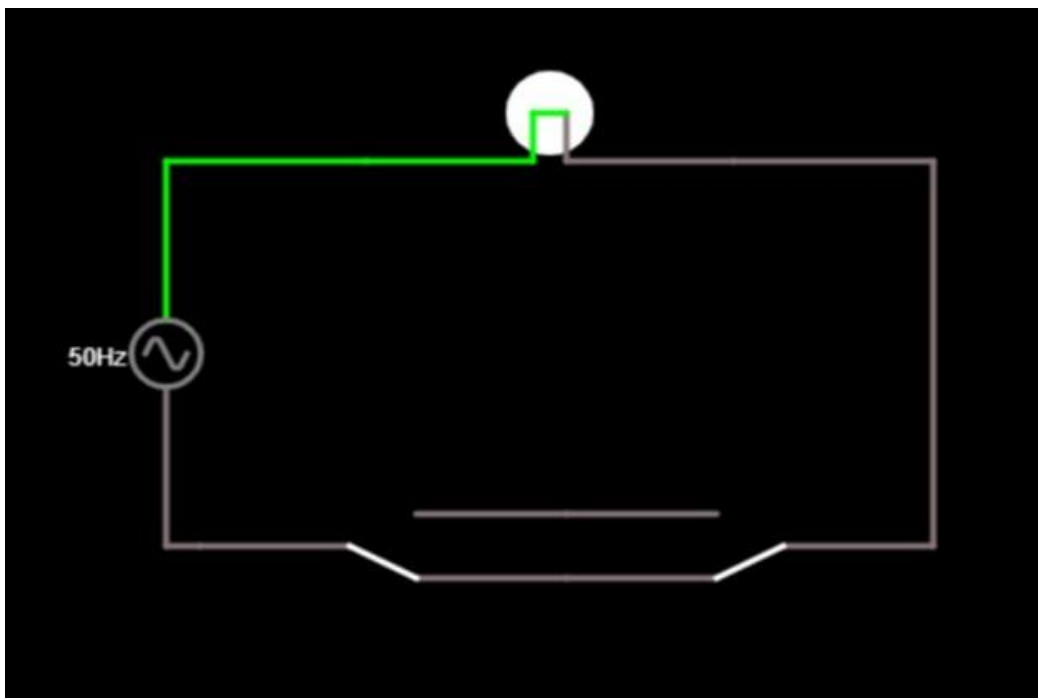
SWITCH S1 IN 1 AND S2 IN 3' POSITION



SWITCH S1 IN 3 AND S2 IN 1' POSITION



SWITCH S1 IN 3 AND S2 IN 3' POSITION



Result: Hence, stair-case wiring is verified

POST LAB QUESTIONS

1. What is the use of staircase wiring?

Staircase wiring is a common multi-way switching or two-way light switching connection; one light two switches wiring. That is to operate the load from separate positions such as above or below the staircase,

2. Why choke is used in fluorescent lamp?

The purpose of the choke is to provide a very high voltage initially between the filaments (across the two ends of the tube light). 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?

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 ballasts alter the flow of electricity in the light bulb by using a series of induction coils that are separated from one another. In contrast, magnetic ballast uses 1 induction coil and not a series.

5. List out the advantage of staircase wiring

Advantages of Using Staircase Wiring:

- Easy to control appliances from various points.
- Faster control than a single switch.
- Highly Efficient for larger places.
- Living Comfort can be increased.
- Electricity can be saved.