

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	: Arnav Shukla
Register Number	: RA2111050010001
Date of Experiment	: 17/11/2021

Sl. No.	Marks Split up	Maximum marks (20)	Marks obtained
1	Pre Lab questions		
2	Preparation of observation		
3	Execution of experiment		
4	Calculation / Evaluation of Result		
5	Post Lab questions		
Total		20	

Staff Signature

PRE LAB QUESTIONS

1. How does fluorescent lamp work?

Ans Fluorescent lamp works by ionizing mercury vapour in a glass tube. This causes the electron to emit photons at UV frequencies. The UV light is converted into the standard visible light using phosphor coating on the inside of the lamp.

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

Ans The biggest difference between the two is in how they produce light. Incandescent bulbs produce light by heating a metallic filament until it starts to radiate light. On the other hand, fluorescent lamps produce light by exciting a gas and causing it to glow.

3. What are the advantages of fluorescent light bulbs?

Ans The advantages of compact fluorescents are they are energy efficient, compact in size, have good lumen maintenance, long life, endless shapes and sizes, dimmable, easy retrofit, low operating cost, and radiate less heat.

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

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

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

Ans 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 :

FLUORESCENT LAMP WIRING

Aim:

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

Apparatus Required:

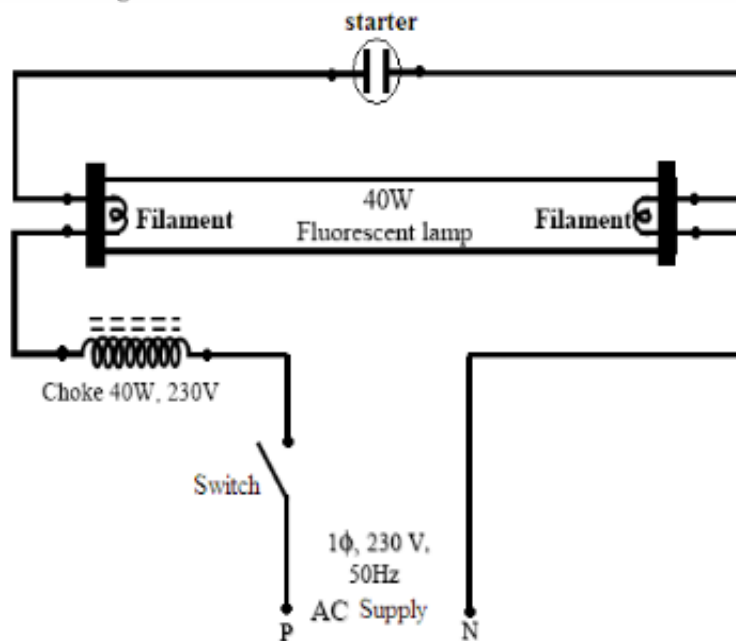
S.No	Components	Range/Type	Quality
1.	Fluorescent Lamp fixture	4 ft	1
2.	Fluorescent lamp	40W	1
3.	Choke	40W, 230V	1
4.	Starter	-	1
5.	Connecting wires	-	As required

Tools Required:

Wire man's tool Kit

- 1 No

Circuit diagram:



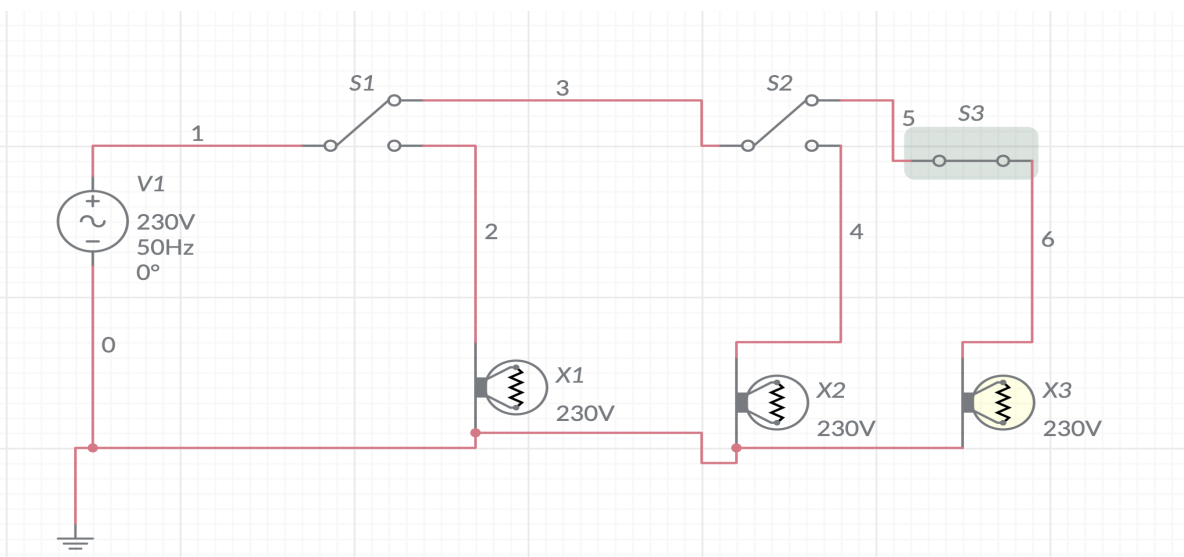
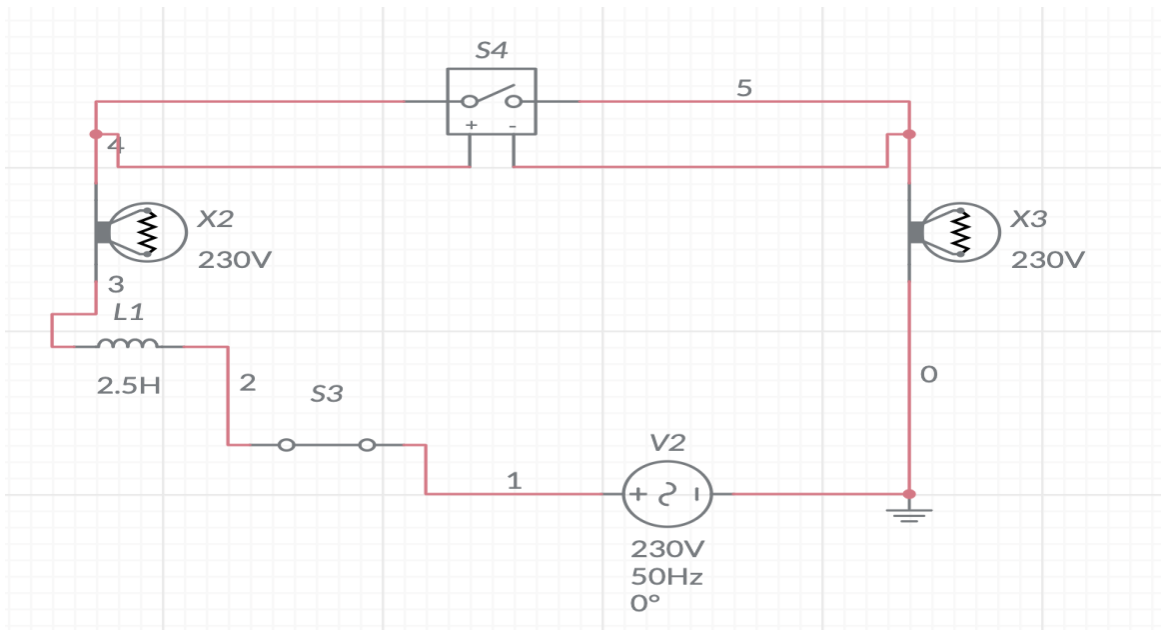
Theory:

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.

eCIRCUIT DIAGRAM:



Result

The connection of the fluorescent was studied and performed.

Experiment No. b)

Date :

6. b) STAIRCASE WIRING

Aim:

To control a single lamp from two different places.

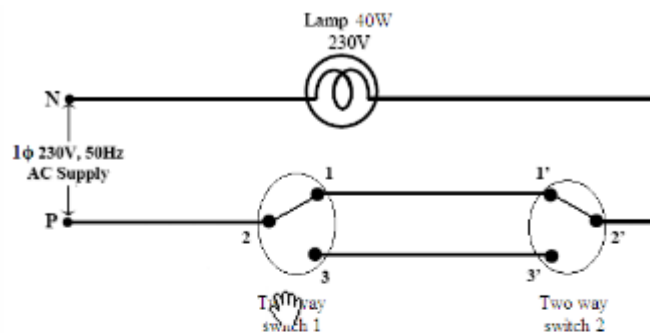
Apparatus Required:

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:

Position of switches		Condition of lamp
S1	S2	

DIRECT CONNECTION

Position Of Switches		Condition Of Lamp
S1	S2	
0	0	ON
1	1	ON
0	1	OFF
1	0	OFF

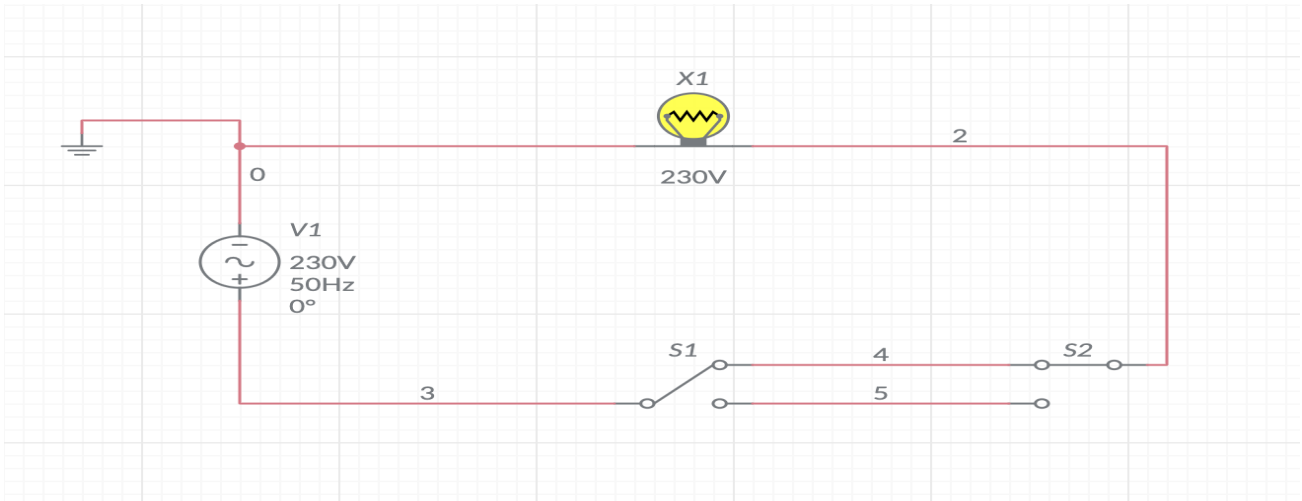
CROSS CONNECTION

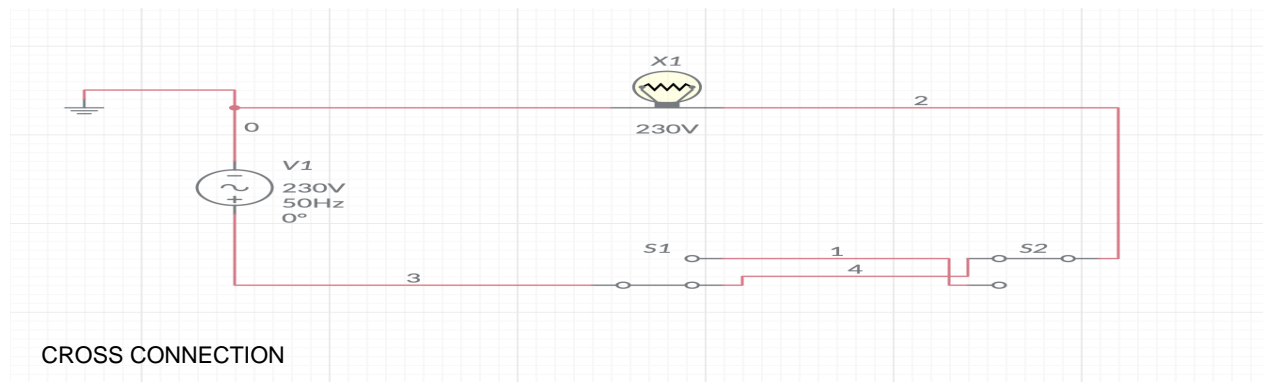
Position Of Switches		Condition Of Lamp
S1	S2	
0	0	OFF
1	1	OFF
0	1	ON
1	0	ON

1 = ON, 0 = OFF

eCIRCUIT DIAGRAM:

DIRECT CONNECTION





Result

Study on how to control the lamp from two different places.

POST LAB QUESTIONS

1. What is the use of staircase wiring?

Ans A Staircase wiring makes the feasibility for the user to turn ON and OFF the load from two switches placed apart from each other.

2. Why choke is used in fluorescent lamp?

Ans 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?

Ans In a fluorescent lighting system, the ballast regulates the current to the lamps and provides sufficient voltage to start the lamps. Without a ballast to limit its current, a fluorescent lamp connected directly to a high voltage power source would rapidly and uncontrollably increase its current draw.

4. Compare electronic ballast and magnetic ballast?

Ans A magnetic ballast uses coiled wire and creates magnetic fields to transform voltage. ... An electronic ballast uses solid state components to transform voltage. It also changes the frequency of the power from 60 HZ to 20,000 HZ or higher depending on the ballast.

5. List out the advantage of staircase wiring

Ans Staircase lighting puts the light exactly where your feet go. There is no shadow cast on the treads. Overhead lighting will cause shadows when your body gets between the overhead light source and the stair treads. One disadvantage is the extra cost to install this type of system.