Characteristics Of Lamps

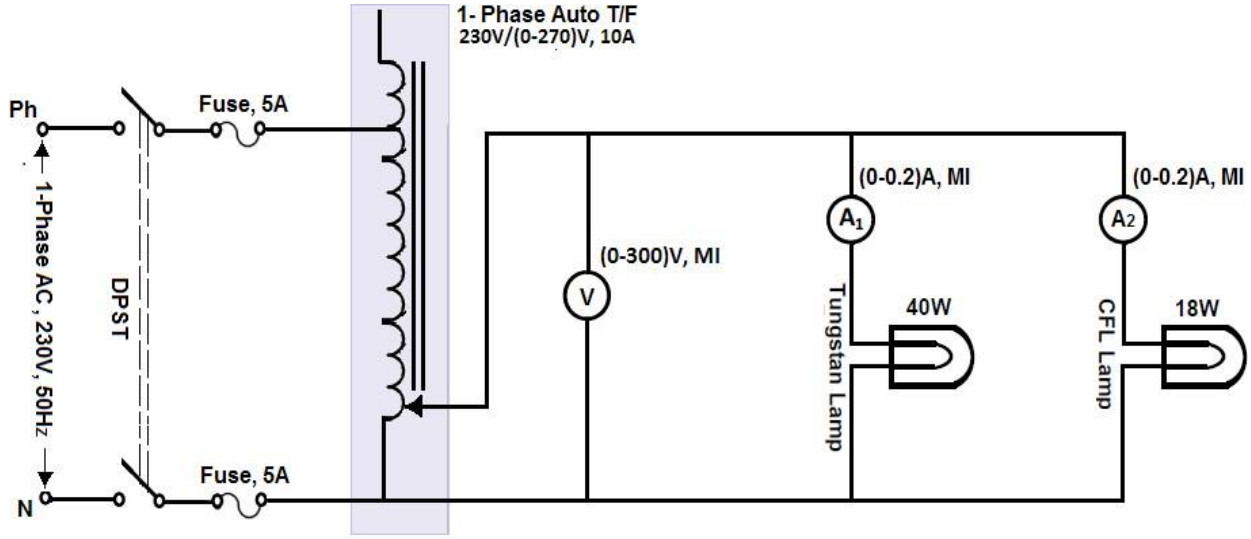
Exp. No: **Date:**

Aim: To study the *V–I* characteristics of Incandescent (Tungsten Filament Lamp) and Compact Fluorescent Lamp (CFL).

Apparatus required:

S.No	Name of the equipment	Range/ Specification	Type	Quantity
1	Voltmeter	(0-300) V	MI	1
2	Ammeter	(0-0.2) A	MI	2
3	Tungsten filament Lamp	40W, 230V	Incandescent	1
4	Compact fluorescent lamp **(CFL)**	18W, (220-240)V	Discharge	1
5	1- Phase Auto Transformer	I/P: 1-ϕ, 230V O/P: (0-270)V, 10A	Core type	1
6	Connecting wires	1.5 Sq.mm	Copper	Required

Circuit diagram:



Circuit diagram for V-I Characteristics of Lamps

Procedure:

1. Connect the circuit as per circuit diagram.
2. Increase the autotransformer output voltage in steps of 30 V, until the lamp rated voltage is obtained.
3. At each step, note the readings of V, A1, and A2 record them in Table.
4. Decrease the autotransformer output voltage in steps of 30V from lamp rated voltage i.e. 230V to zero volts and tabulate them.

Tabular column:

S No	Supply Voltage (V_s)		Current (A_1) (Tungsten)		Current (A_2) (CFL)		Lamp condition	
	Incr	Decr	Incr	Decr	Incr	Decr	Incr	Decr

Theoretical calculations:

Tungstun filament lamp:

$$\text{Power } (P) = \frac{V^2}{R}$$

$$\text{Cold resistance of the filament } R_0 = \frac{V^2}{P}$$

$$\text{Current drawn by the filament when it is cold } I_0 = \sqrt{\frac{P}{R}}$$

$$\text{Hot resistance of the filament } R = \frac{V}{I} \text{ (OR)}$$

$$\text{Hot resistance of the filament } R = R_0 (1 + \alpha \Delta T)$$

$$\text{Current drawn by the filament when it is hot } I = \frac{V}{R}$$

- *R_0 is the original resistance(Cold) (OR) Resistance at room temperature(T_0)*
- *R is the resistance after a temperature change(T)*

- ΔT *is the change in temperature*$=(T-T_0)$
- α *is the temperature coefficient of resistivity* (4.5×10^{-3})

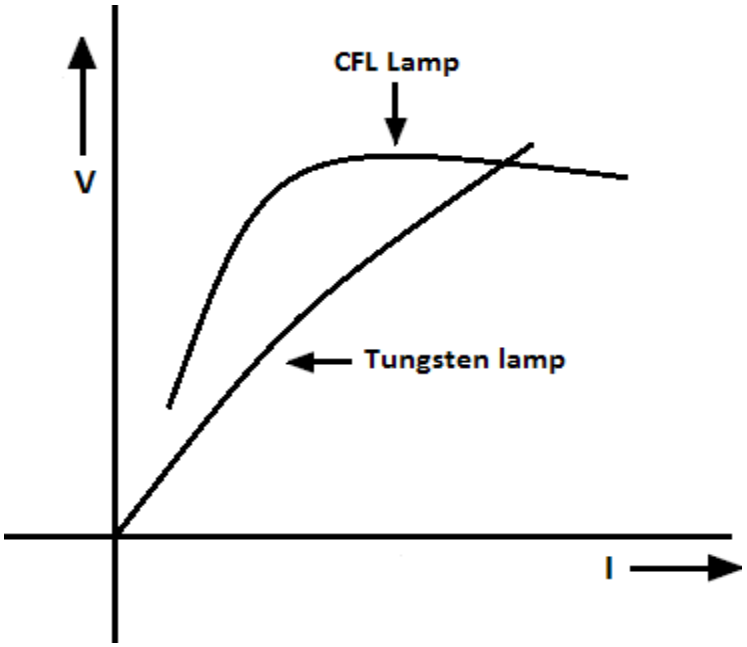
CFL Lamp:

$$Power\ (P) = V\,I$$

$$I = \frac{P}{V}$$

$$R = \frac{V}{I}$$

Model graph:



Precautions:

1. Use proper range of the meters.
2. Take the readings without parallax error
3. All the connections should be tight.

Result: