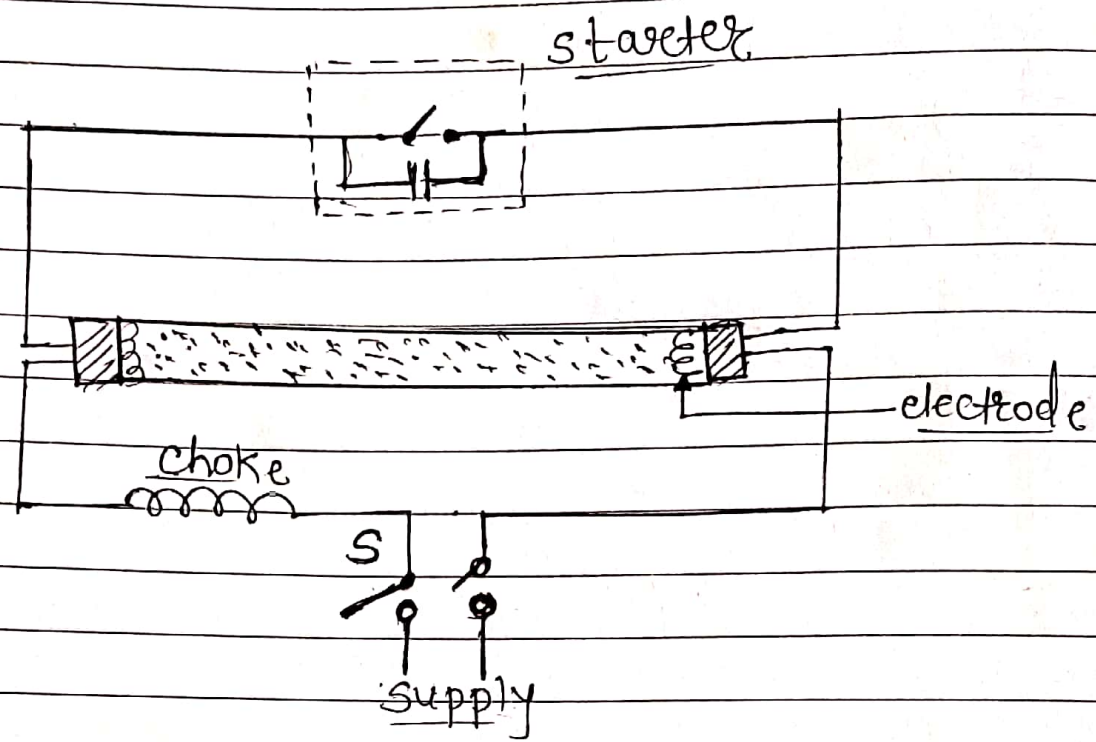


* Fluorescent Tube:-



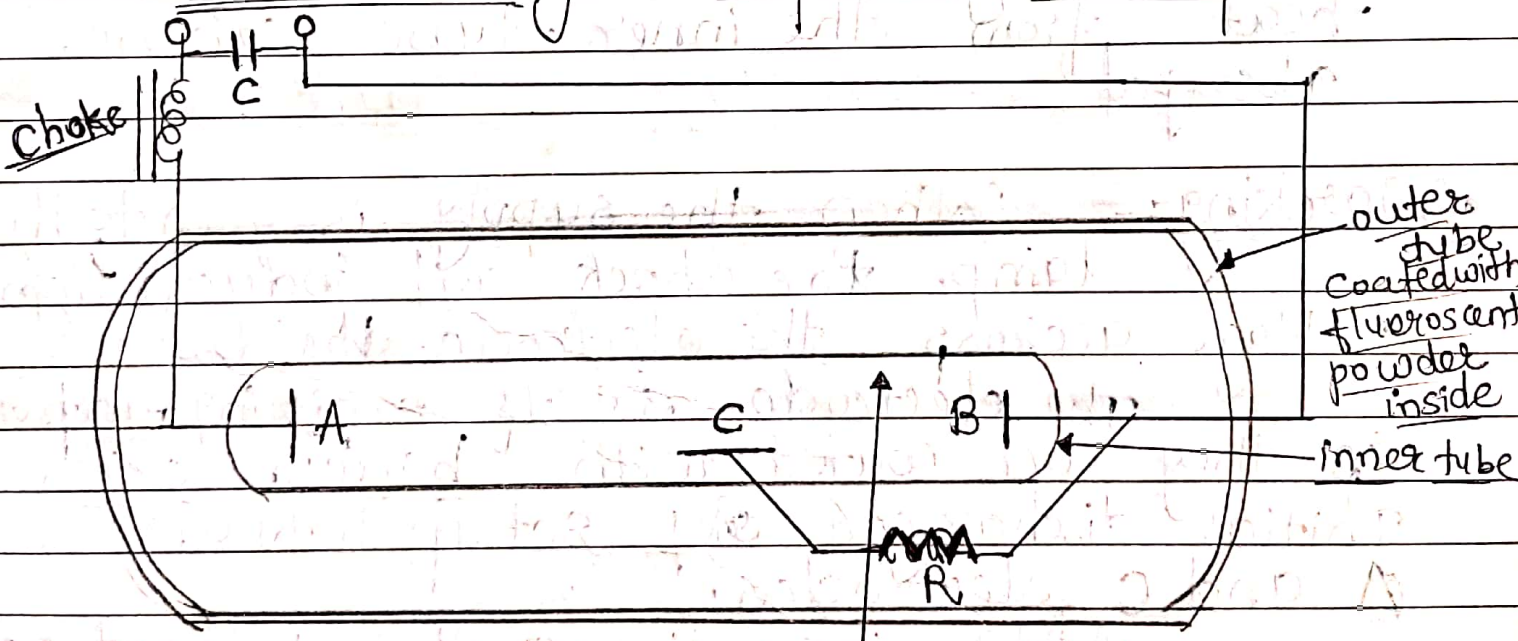
It consists of a long cylindrical tube. on the either side of the tube, two tungsten filaments are placed. the tube is coated with fluorescent powder from inside. and its filled with argon gas with small quantity of mercury. the control circuit consist of choke and starter

* Working:- When the switch (S) is turned on current start flowing through the electrode. the electrodes are coated with an emissive material like Barium oxide or calcium oxide. when the electrodes get heated, it start emitting electrons. The choke coil induces high voltage

of 800 to 1000V. in the circuit. the starter is made to conduct at high voltages. therefore this high voltage appears across electrodes.

Due to this high voltage an electric discharge takes place between two electrodes due to this discharge the voltage across electrodes ~~reduces to~~ ^{falls} to about 110V. and the circuit current now ^{flows} closed ~~through~~ the tube itself. hence, the starter is only used to start the tube.

* Mercury Vapour Lamp :-



A, B, C → electrodes.
R → Resistance.

Argon + Mercury
completely evacuated
area this is also
called as electric discharge lamp.

It produced light by gaseous conduction

• Construction:-

It consists of two glass-tube the inner-glass tube consists of three electrodes may A and B and auxiliary C electrode. the inner tube is filled with argon gas and small amount of mercury. the inner-tube is placed inside the outer tube. the outer-tube is coated with fluorescent powder from inside. the area within the two tubes is completely evacuated so that the heat from the inner-tube can be absorbed.

• Working:- When the supply is given to the lamp. the choke coil induces high voltage across the electrode. the electrode starts emitting electrons as they are coated with barium oxide (emissive material). Initial discharged ~~is~~ setup between A and C electrodes.

After some-times the temperature further increases resulting in more electrons in inner-tube. and the final discharged is setup between electrode A and B. this process takes place 4 to 5 minutes and the lamp reaches to full intensity.

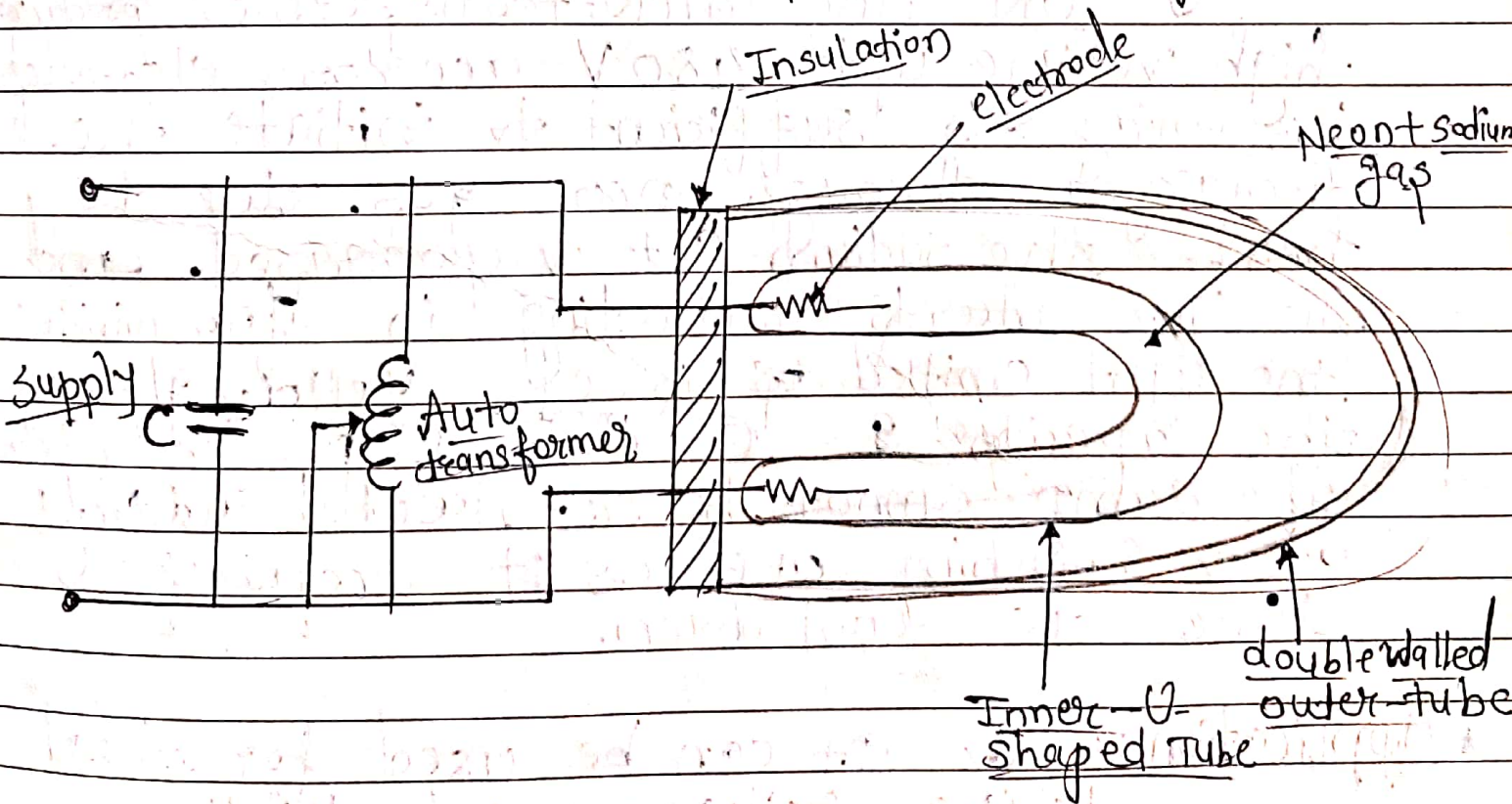
Caution must be taken that once the lamp is switched off, it must be re-started after 8 to 10 minutes, as the lamp takes time to cool down.

The lamp consumes high reactive power, hence, the capacitor is connected to improve power factor.

Applications:-

Stadium flood lighting, industrial lighting, street lighting, railway yard lighting.

* Sodium Vapour Lamp:-



• Construction:- It consists of an inner-tube of U-shaped, and made up of a special Sodium-vapour resisting glass. It consists of two coated tungsten electrodes which are connected across an Auto transformer. The inner-U-tube contains neon gas and small amount of sodium. The inner-U-tube is enclosed in double walled vacuum flask type tube and is well insulated in order to conserve the heat required to vapourize sodium.

• Working:- When the supply is switched 'ON' the auto-transformer produces high voltage upto 480V across electrodes. This voltage is sufficient to initiate the discharge through neon gas. Due to heat the sodium gets vapourized and the light starts operating in few minutes. The light emitted is of yellow glow. The capacitor C ^{increases} ~~decreases~~ power factor. The lamp cannot be re-started suddenly after switching OFF as it requires time to cool down.

* Applications:- \Rightarrow It can be used for street lighting, railway yard lighting, etc.

* CFL (Compact Fluorescent Lamp):-

A CFL is a type of fluorescent lamp. since from early days of electricity the incandescent lamp was used having low efficiency of illumination as the technology changes the lighting system evolved to fluorescent lighting and now the CFL which uses less power and gives ^{even} greater illumination. the CFL are having greater light but have higher purchase price. the CFL uses electronic ballast hence, the harmonic problems created by electromagnetic ballast are removed from the system.

* Constructions:- there are two main parts.

- 1) gas field tube.
- 2) Electronic Ballast.

Electronic ballast contains small circuit with rectifier, a filter capacitor and usually two switching transistor connected as a high frequency resonant D.C to A.C inverter.

The high frequency 40 kHz is applied to the lamp.

* Working:- when the electrical current from the ballast flows through to the gas and ultra violet light emission takes place this ultra-violet light exists a white

phosphor coating on the inside of the tube.
This coating emits visible light.
Now a days the CFL's using electronic ballast are widely used.

* Comparison with Incondense lamp

1) The average rated light is 6000 ^{life} 15000 hrs. where as incondense lamp life span is 750 hrs to 1000 hrs.

2) Energy efficiency: - The for a given light output CFL used between 1/5th of power of an equivalent incondense lamp.

• Cost :- The purchase price of CFL is 3 to 10 times greater than that of incondense lamp but extended life time and lower energy use will compensate for the higher initial cost.

3) Starting time :- Incondense lamp gives light almost immediately but CFL takes certain time to achieved full brightness.