

P.K.A.I.E.T., BARGARH

ELECTRICAL WORKSHOP PRACTICE

COURSE AS PER S.C.T.E & V T, ORISSA

(SEMESTER – VI)

BRANCH- ELECTRICAL ENGINEERING

Total Period:- 90

Examination:- 4 Hours

Total Marks:- 100

No. of Period:- 6 P/W

Practical:- 50 Marks

Sessional:- 50 Marks

Performable Experiment:-

EXPERIMENTS

PERIOD

- | | |
|---|----|
| 1. Preparation of pipe earthing installation for residential building. | 09 |
| 2. Preparation of Britannia T-joint and Married joint . | 09 |
| 3. Connecting and Testing of Fluorescent lamp , high pressure M.V. lamp and Sodium Vapour lamp & measure inductance of each choke. | 09 |
| 4. Prepare battery charger | 06 |
| 5. Residential building wiring practice for PVC and conduit wiring and testing. | 15 |
| 6. Fault finding & repairing of fan motor. | 06 |
| 7. Fault finding & repairing of D.C. Generator | 06 |
| 8. Battery charging and test the voltage and specific gravity. | 06 |
| 9. Construction of a fan speed regulator using TRIAC . | 06 |
| 10. Fault finding a D.C. motor starter and A.C. motor starter. | 06 |
| 11. Power cable jointing with cable box and jointing compounds. | 06 |
| 12. Use of crimping tools and sockets for L.T and H.T cables. | 06 |

EXPERIMENT NO.1

Sign. of Sr.Lect./Lecturer

AIM OF THE EXPERIMENT :

To measure the Earth Resistance of a Pipe Earthing.

OBJECTIVES OF THE EXPERIMENT :

At the end of this Experiment, the students will be able to :

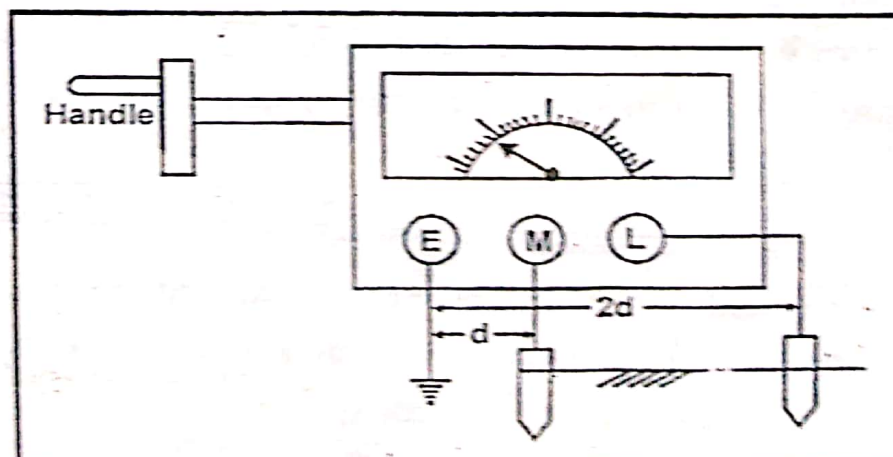
- Define Earthing
- Define the standard of I.S. specification for pipe earthing.
- Know the procedure for earth resistance testing.
- Measure the earth resistance by using earth tester.

SETUP OF EXPERIMENT

Equipment / Material Required

Sl.No.	Name of the Equipment / Material	Range / Specification	Quantity
01.	3-Point earth Tester (Analog/Digital)		
02.	G.I. earth probe with connection arrangement	13mm. Dia, 50 cm. Length	
03.	Connecting leads	7/20 S.W.G.	
04.	Hammer	5 Kg.	
05.	Measuring Tap	30 meter	

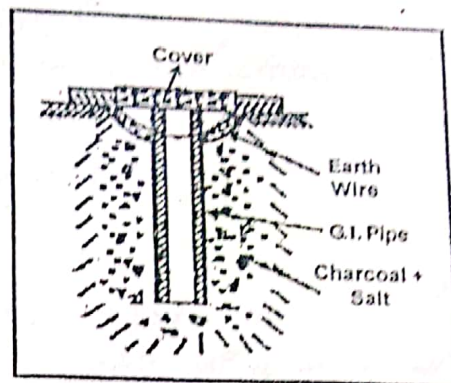
CIRCUIT DIAGRAM :



THEORY:

Pipe Earthing :

In case of Pipe earthing, a cast iron pipe of 30-75 mm diameter and 2.5 - 3.0 meters length is buried in the pit along with the salt and charcoal as shown in the given fig. The pipe should have sufficient holes at its surface, so as to maintain the dampness inside the pipe. An earth wire is tied near the top of the pipe with the help of a clamp. In order to have an effective earth, one or two buckets of water may be poured in the pipe, especially in the summer season.



A. 3 - Point Earthing Tester :

- a. The device measures the earth resistance directly.
- b. This consists of three elements 'E', 'M', 'L'.

B. Earthing installation :

- a. Earthing is a safety device which allows an easy path for the leakage current.
- b.

The resistance of earth installation for domestic purposes (low voltage system) should be less than 5 ohm as per I.C.P.

PROCEDURE :

- a. **Measure** a distance of 75 mts. and 150 mtrs. in the straight line with the earthing installation or the above, distance may be made as per the instruction manual of the earth tester used.
- b. **Insert** the earth probe into the ground to a depth of 1.2 mts. By hammering.
- c. **Connect** the earth installation after cleaning the G.I. flange to 'E' terminal of the earth tester.
- d. **Connect** the two earth probes to 'M' and 'L' terminals of the earth tester.
- e. **Set zero adjustment** of the earth tester by turning the zero adjustment knob.
- f. **Rotate** the handle at a speed of 3 rps and see that the instrument is not vibrating.
- g. **Observe** the deflection of pointer at the steady position. Press the stop switch of the earth tester to note the reading.

OBSERVATION :

The 'measured earth resistance is _____ Ohms.

SAFETY AND PRECAUTIONS :

- a. Handle of the earth tester should be rotated in clockwise direction.
- b. Earth tester should not be connected with live line.

ASSIGNMENT QUESTIONS :

1. Is the value of resistance measured within the prescribed limit ? If not, suggest the steps to be taken for improvement.
2. What is pipe earthing ?
3. Draw the construction of a pipe earthing ?
4. What is the function of a earth tester ?
5. What is the specification required for G.I. earth arrangement ?

BRITANIA T-JOINT

AIM OF THE EXPERIMENT:- To make a Britania T-joint in H.D.B.C. wire No.8 S.W.G.

TOOLS & MATERIAL REQUIRED :

Sl. No.	Name of the items	Type	Range	Quantity
1	H.D.B.C.wire	S.W.G.	No.8	2 pieces of 30 cm each
2	Binding Wire	S.W.G.	No.20	3 mts
3	Sand paper	-----	No.000	10 cm sq.
4	Combination pliers	-----	-----	1
5	Side cutting pliers	-----	-----	1
6	Try square	-----	-----	1
7	Steel rule	-----	-----	1
8	Hand vice	-----	-----	1

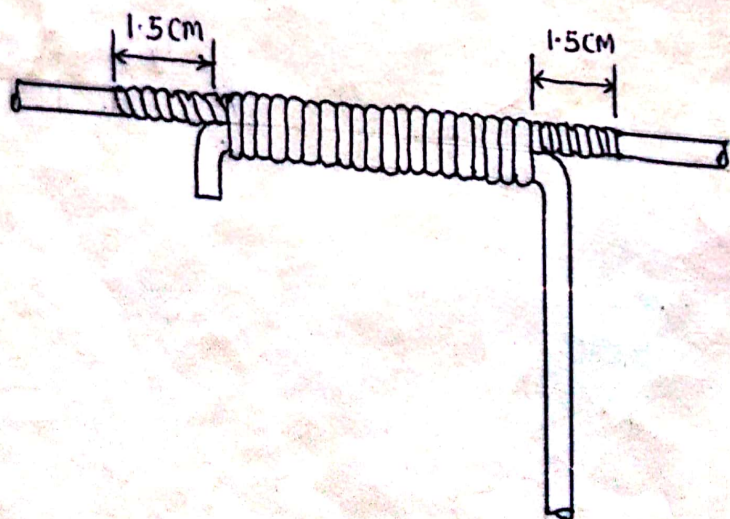
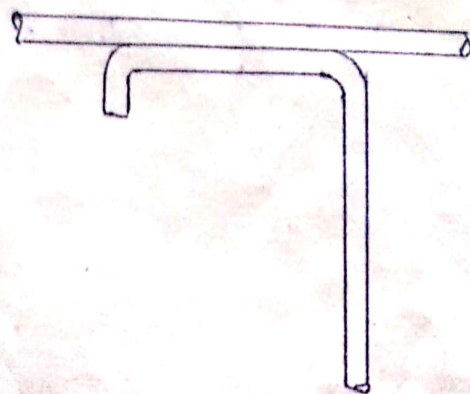
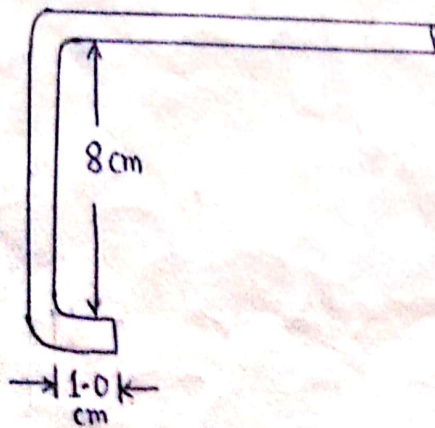
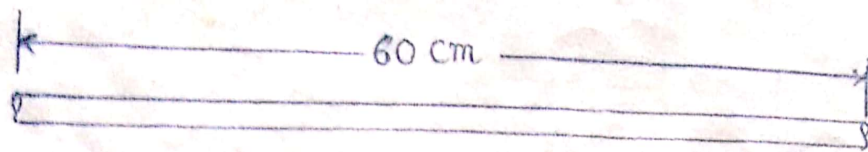
PROCEDURE :-

1. Take two pieces of H.D.B.C wire and make them straight.
2. Clean both the wires with sand paper.
3. Take one piece of wire and bend it at 1 cm from one end at right angle .
4. Again bend the same piece of wire at right angle in the same direction keeping the distance 8 cms from the first bend .
5. Lay the wire together and start binding with binding wire 1.5 cms before the bend .
6. Binding should be very tight on both the wires and it should be completed beyond the 1.5 cms of the other end .

PRECAUTION :-

1. Both wires must be closed to each other.
2. Bends should be at right angles .
3. There should be no gap between the turns.
4. Finally joint must not be loose.

CONCLUSION :- We able to know about the binding of Britania T-joint .



BRITANIA 'T' JOINT

BRITANIA STRAIGHT JOINT

AIM OF THE EXPERIMENT :- To make a Britania Straight joint in bare conductors.

TOOLS & MATERIAL REQUIRED :

Sl. No.	Name of the items	Type	Range	Quantity
1	H.D (hard drawn) bare copper wire	S.W.G	No.8	2 pieces 20 cms each
2	Binding wire(copper)	S.W.G	No.20	3 mts
3	Sand paper	-----	No.000	10 cms sq.
4	Combination pliers	-----	-----	1
5	Side cutting pliers	-----	-----	1
6	Try square	-----	-----	1
7	Steel rule	-----	-----	1

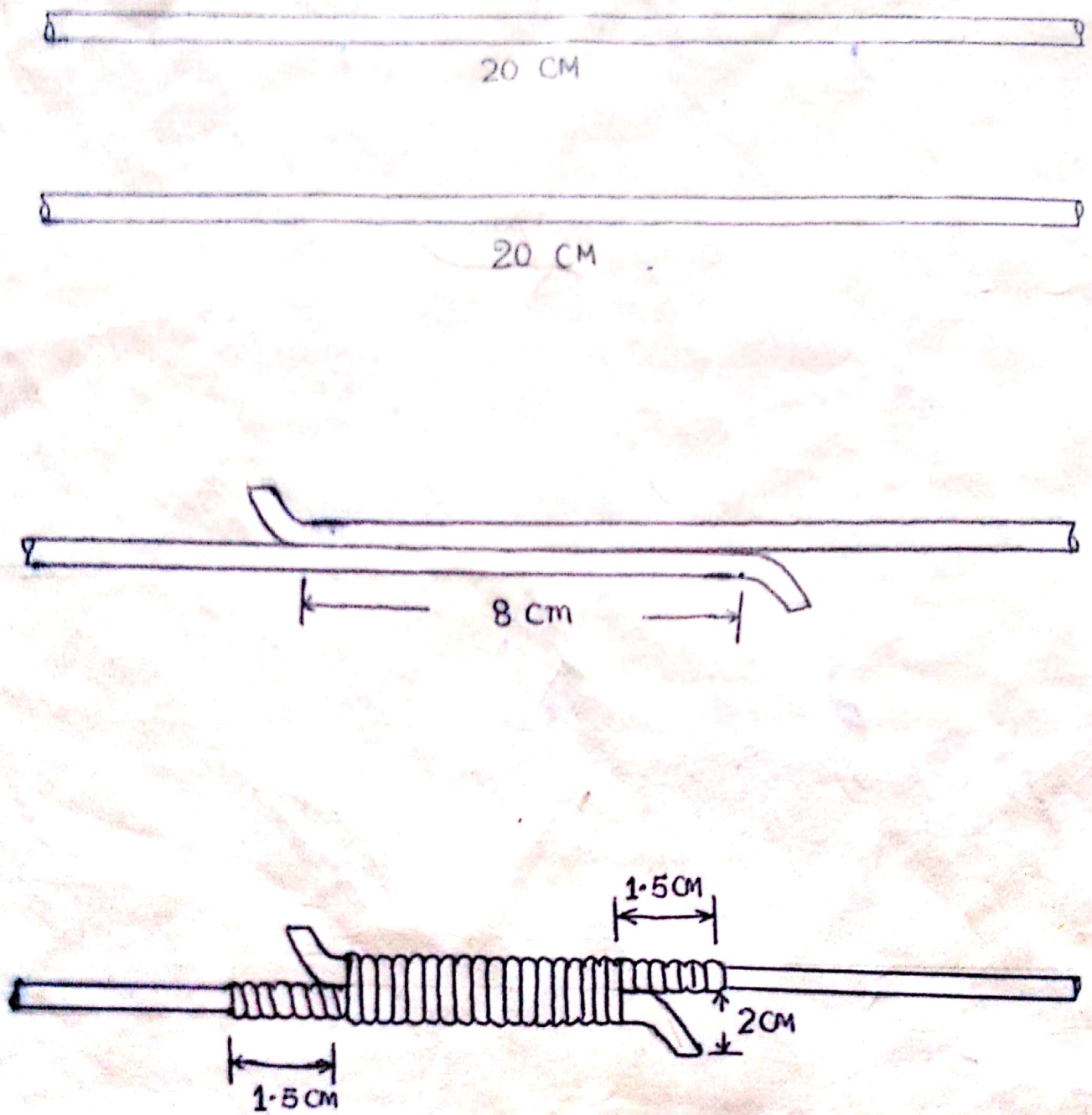
PROCEDURE :-

1. Take two pieces of H.D.B.C wire and make them straight.
2. Clean both the wires with sand paper.
3. Bend both the wires 2 cm. from one end only, at right angle or 120° .
4. Lay the wire together and start binding with binding wire 1.5 cms before the bend.
5. Binding should be very tight on both of the wires and it should be completed beyond 1.5 cm after the bend of the other wire.

PRECAUTION :-

1. Both the wires must be laid very close to each other.
2. Bends should be at right angles or at 120°
3. There should be no gap between the turns.
4. Finally joint must not be loose.

CONCLUSION :- We able to know about the binding of Britania Straight joint .



BRITANIA JOINT

MARRIED JOINT

AIM OF THE EXPERIMENT :- To make a straight joint in stranded V.I.R. or P.V.C wire (Married joint)

Sl.No.	Material Required	Qty	Sl.No.	Tools	Qty
(i)	V.I.R wire 7/0.036 or P.V.C wire 10 mm ²	2 pieces of 20 cm each	(iii)	Steel Rule	1
(ii)	Sand paper No. 0	10cm sq	(iv)	Nipper	1
			(v)	Plier	1
			(vi)	Electrician knife	1

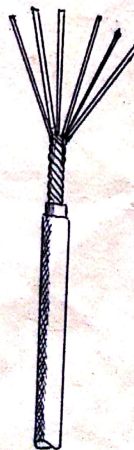
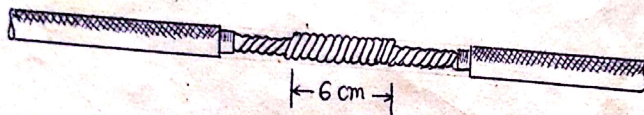
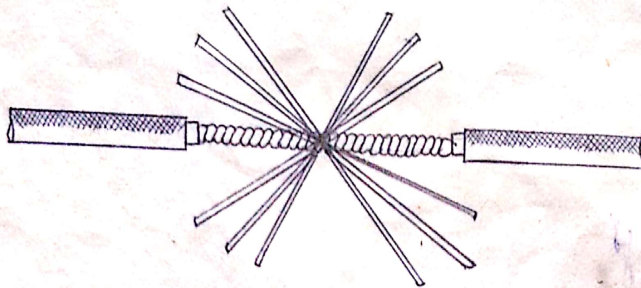
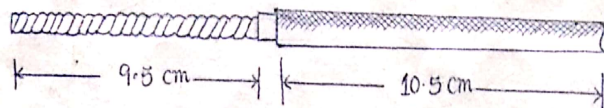
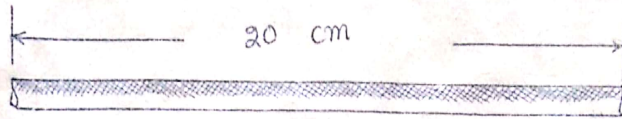
PROCEDURE :-

1. Remove the insulation to length of 9.5 cms from one end of both the wires.
2. Open the strands and clean them.
3. Twist the strands in the original direction upto the distance of 3.75 cm from the insulation.
4. Cut the middle strand of both the wires and close to twist.
5. Interlock the strands keeping the centre close.
6. Close the strands on and one side forming shoulders.
7. Form shoulders on other side in the possible direction.
8. After completing the joint remove 0.75 cm cotton braiding in V.I.R wires.

PRECAUTIONS :-

1. Joints must not be loose.
2. There should not be any gap between turns.
3. Tinning should not be removed while cleaning.
4. Wire must not be nicked while skinning.

CONCLUSION :- We able to know about the binding of married joint .



MARRIED JOINT

WESTERN UNION JOINT

AIM OF THE EXPERIMENT :- To make a western union joint in a bare conductor.

TOOLS & MATERIAL REQUIRED :-

Sl. No.	Name of the items	Type	Range	Quantity
1	Hard drawn bare copper (H.D.B.C) wire	S.W.G	No.8	2Nos
2	Sand paper.	-----	000	-----
3	Hand vice	-----	-----	1
4	Metal tape	-----	-----	1
5	Hack-saw	-----	-----	1
6	Mallet	-----	-----	1

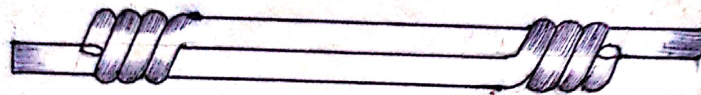
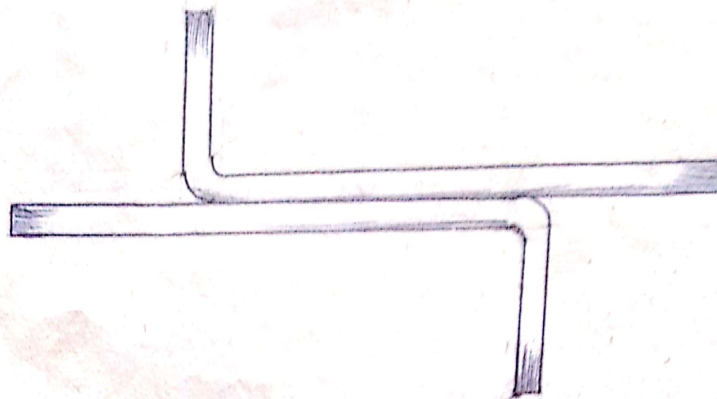
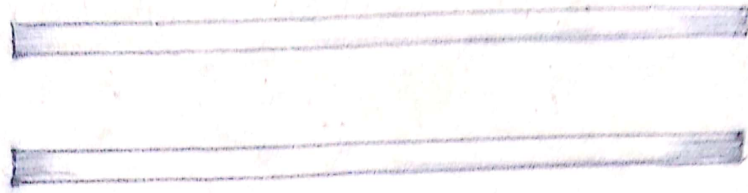
PROCEDURE :-

1. Take two pieces of H.D.B.C wire No.8 S.W.G and make them straight.
2. Clean the wires with sand paper.
3. Bend the wires at 13 cm from the end at right angles.
4. Lay both the wires together in such a way that the right angle should be in the opposite direction and the distance between two right angles should be 13cm.
5. Hold the wires in this position in the hand vice firmly.
6. Bind one wire over other giving three turns.
7. Repeat the same process with other wire in such a way that the binding should be in the opposite direction to the first.
8. Cut the extra wire and thus complete the joint.

PRECAUTION :-

1. There should not be any gap between the wires.
2. Binding direction must be opposite to each other.
3. There should not be any gap between the turns.
4. Joints must be straight and must not be loose.

CONCLUSION :- We able to know about the binding of western union joint



WESTERN UNION JOINT

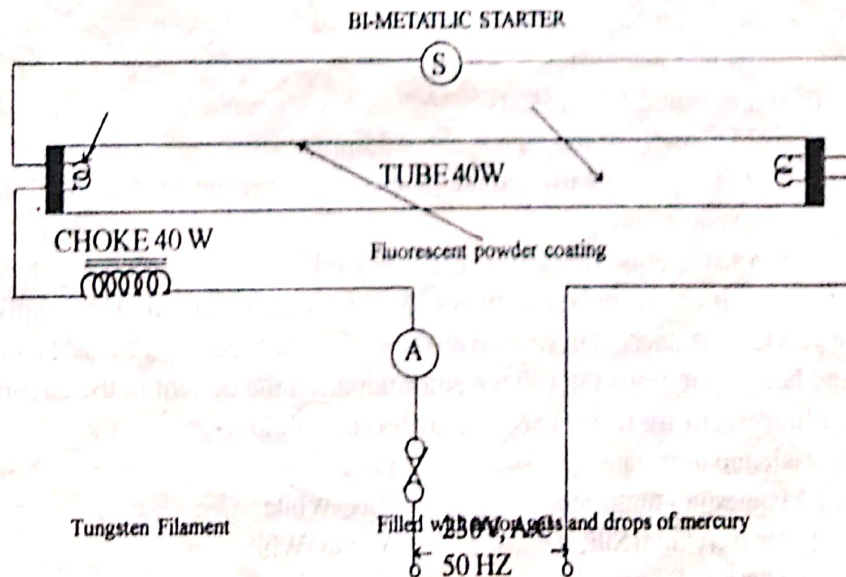
FLUORESCENT LAMP

AIM OF THE EXPERIMENT :- To make connection and testing of fluorescent lamp with A.C. supply and to measure its starting and running current.

TOOLS & MATERIAL REQUIRED:

Sl. No.	Name of the items	Type	Range	Quantity
1	Fluorescent lamp	_____	_____	1
2	Tube holder	_____	_____	2
3	Iron clad choke	_____	_____	1
4	Bi-metallic startor	_____	_____	1
5	Ammeter	M.I.	_____	1
6	Connector screw driver	_____	_____	1
7	Combination plier	Insultd	_____	1
8	Line tester	_____	_____	1
9	Connecting wire	S.W.G	_____	As per req.
10	Series testing board	_____	_____	

INTRODUCTION :- The fluorescent tube is a low pressure mercury vapour lamp. Due low pressure, the lamp is in the form of a long tube coated inside with phosphor. The contains a small amount of mercury and a small quantity of argon gas at a pressure of 2.5mm of mercury. When the temperature increases, the mercury changes into vapour form which it takes over the conduction of current. At each end of the tube electrodes are of spiral form made of tungsten and coated with an electron emitting material. A choke is connected in series with tube filament. It provides a voltage impulse for starting the lamp and acts as a ballast later on when the lamp is running. The filament is connected to a starter switch (Bi-metallic type) which is small cathode glow lamp with metaltrip at electrodes.



Connection diagram of flouscerent lamp

WORKING :- When the starter is cold, the electrodes are open. When supply is given, full voltage acts on the starte. A glow discharge is set up in the starter which worms the electrodes and causes the bi-metal strip to bend and touch the electrodes. The circuit become a complete series. Current flows and causes emission of free electrons from filaments. At the same time voltage at the starter fall to zero and the bi-metal strip cools down. The electrodes of the starter switch then interrupt the current in the circuit. Its effect is to induce high voltage surge of about 1,000 volts in choke. This voltage produces the flow of electrons between the lamp electrodes and the lamp lights up immediately. Then starting switch contacts are left open. A

condenser is connected across the supply to improve the p.f. usually of 4 μ F

PROCEDURE :-

1. Make a circuit for the connection of fluorescent lamp.
2. Test all the components such as choke, starter and filament of lamp with the help of series testing board. If all components found tested or O.K. connect the components as per ckt. diagram.
3. Connect the line or positive wire through the choke and negative direct to the tube
4. Connect the starter in between the remaining two terminals of the filament.
5. Connect the ammeter in series with choke.
6. Switch-on the supply to the two end point of the connection and note the ammeter reading. This is the starting current.
7. After 5 minutes again note the ammeter reading which gives the running current.
8. Switch-off the supply to disconnect the lamp from supply.

TABULATION :

Sl. No.	Starting current in amp .	Running current in amp .

PRECAUTION :-

1. All the connection should be right and tight.
 2. The iron frame should be earthen properly.
 3. All the equipment used should be of correct rating.
- CONCLUSION :-** From this we able to connect the fluorescent tube with the supply and test their components .

N.B. :- 1. These lamps have the different wattage and length as

- (i) 20w and 0.6m (2feet)
- (ii) 40w and 1.2m (4feet)
- (iii) 65,80w and 1.5m (5feet)

2. Diameter of the tube is about 35mm .

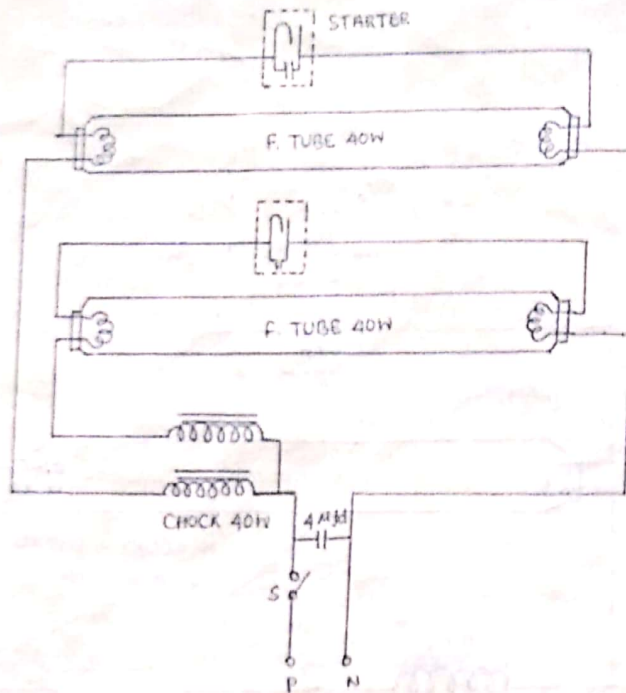
3. Phosphorous used in the tube converts the ultra-violet rays into visible light .

4. Life period of the tube is 6,000 working hours .

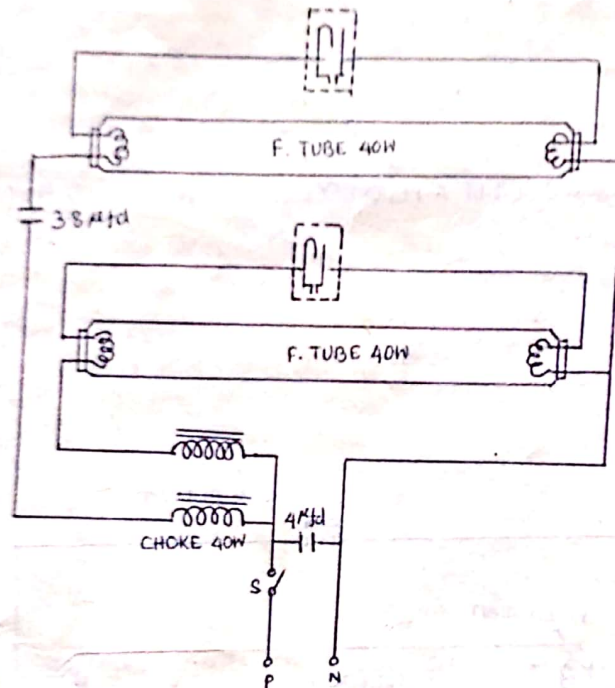
5. It can be operated on A.C. & D.C. (When used on D.C. supply a resistance is connected in series with the choke which acts as a ballast in the beginning and latter on it drops the voltage and smoothens the current in the circuit.

6. Fluorescent material used for different colour :-

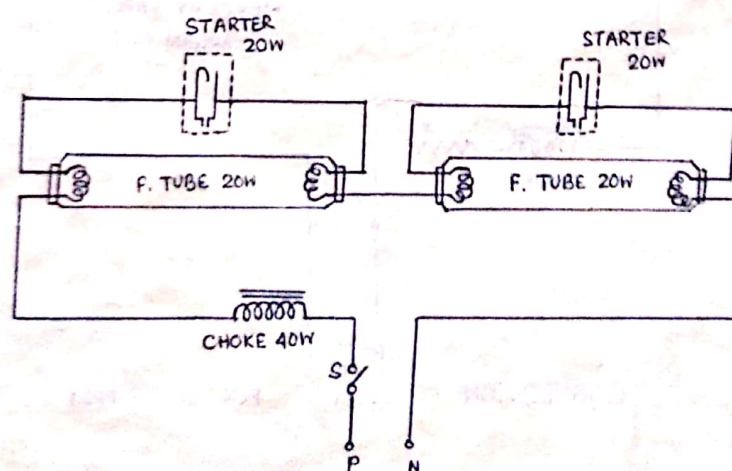
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|-------------------------------|--------------|
| (i) Calcium tungstate | Blue |
| (ii) Magnesium tungstate | Blue-White |
| (iii) Zinc Beryllium Silicate | Yellow-White |
| (iv) Cadmium Silicate | Yellow-Pink |
| (v) Cadmium borate | Pink |
| (vi) Zinc Silicate | Green |



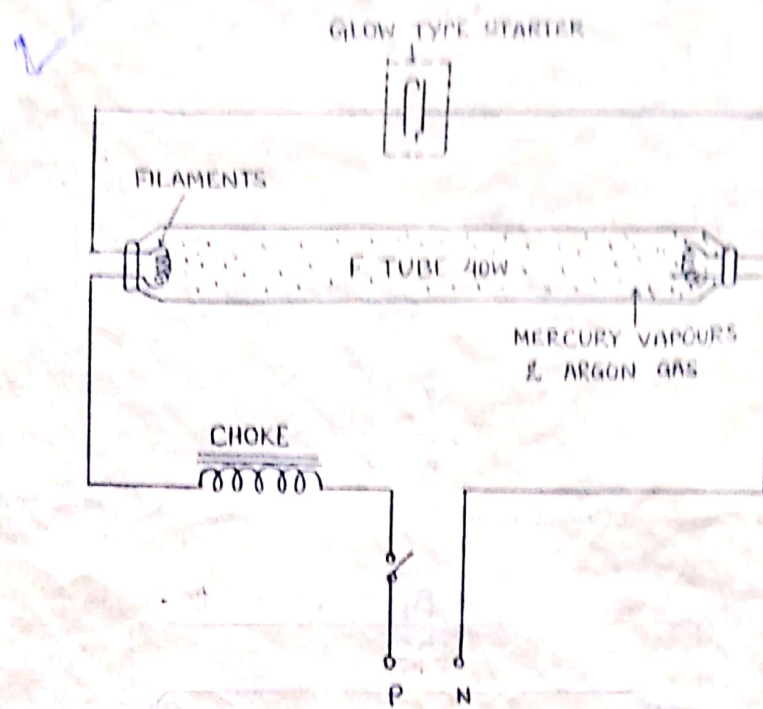
CONNECTION OF TWIN F. TUBES FOR STREET LIGHT



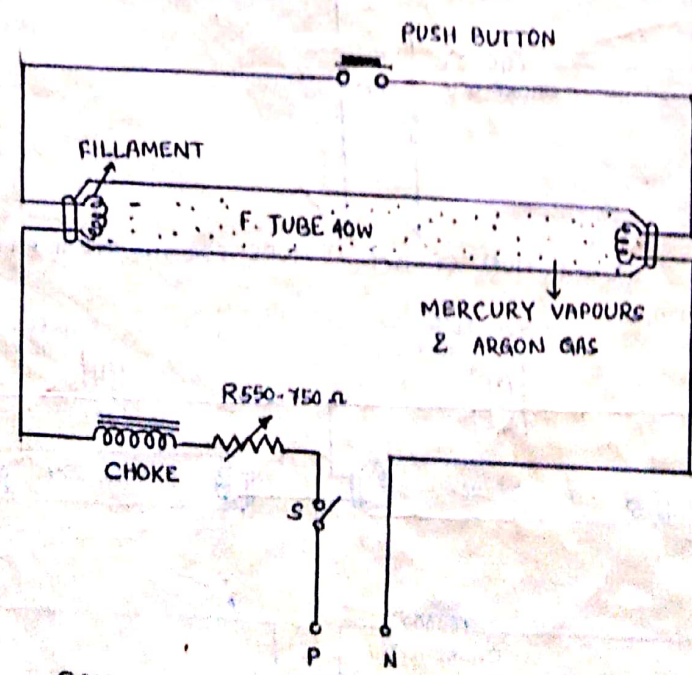
CONNECTION OF TWIN F. TUBE FOR INDUSTRIAL FITTINGS



CONNECTION OF TWO 20W TUBES WITH A 40W CHOCK



CONNECTION OF A FLUORESCENT TUBE FOR A.C. SUPPLY



CONNECTION OF F. TUBE FOR D.C. SUPPLY

HIGH PRESSURE MERCURY VAPOUR(H.P.M.V.)LAMP

AIM OF THE EXPERIMENT :- To make connection for lighting high pressure mercury vapour(H.P.M.V.)lamp with A.C. supply and to measure its starting and running current.

TOOLS & MATERIAL REQUIRED :-

Sl. No.	Name of the items	Type	Range	Quantity
1	H.P.M.V lamp			1
2	Choke for the lamp			1
3	3-cut holder			1
4	Ammeter			1
5	Switch			1
6	Connector screw driver			1
7	Combination plier	Insul ^{td}		1
8	Line tester			1
9	Connecting wire	S.W.G		As per req.
10	Series testing board			1

INTRODUCTION :- In high pressure mercury vapour (HPMV)lamp ,two main electrodes of tungsten coated with barium oxide are enclosed in a hard glass or quartz tube .There is an auxiliary starting electrode near one of the main electrode .This quartz tube is enclosed in another ordinary glass bulb whose internal surface is coated with fluorescent powder. The space between the tube and the bulb is evacuated to reduce the heat loss. A choke coil having different tapping is connected in series with the lamp to give high starting voltage for discharge and for controlling the current and voltage across the lamp after discharge .The p.f. of the circuit is poor due to choke coil which can be improved by installing a condenser in parallel to the supply line .

WORKING:- Initially when the switch is put ON for starting ,the current does not flow through the main electrode due to high resistance of the gas .However the current starts to flow between the main electrode and auxiliary electrode through the argon gas .The heat thus produced ,vaporizes the mercury which reduces the resistance between the main electrodes and thus discharge takes place between the two main electrodes . This is due to the high voltage induced in the choke coil due to the momentary interruption of current in the auxiliary electrode .

PROCEDURE :-

1. Make a circuit for the connection .
2. Test the choke and the lamp with the help of series board .
3. Connect the positive wire through choke (*Marked point 240V*)and common point (*C*)to one end of the lamp .
4. Negative is directly connected to the other end of the lamp .
5. Connect the ammeter in series with choke .
6. Switch-on the A.C.supply .
7. Take the reading of ammeter at starting and working (After 5 minutes)
8. Switch-off the supply to disconnect the lamp from supply .

TABULATION :-

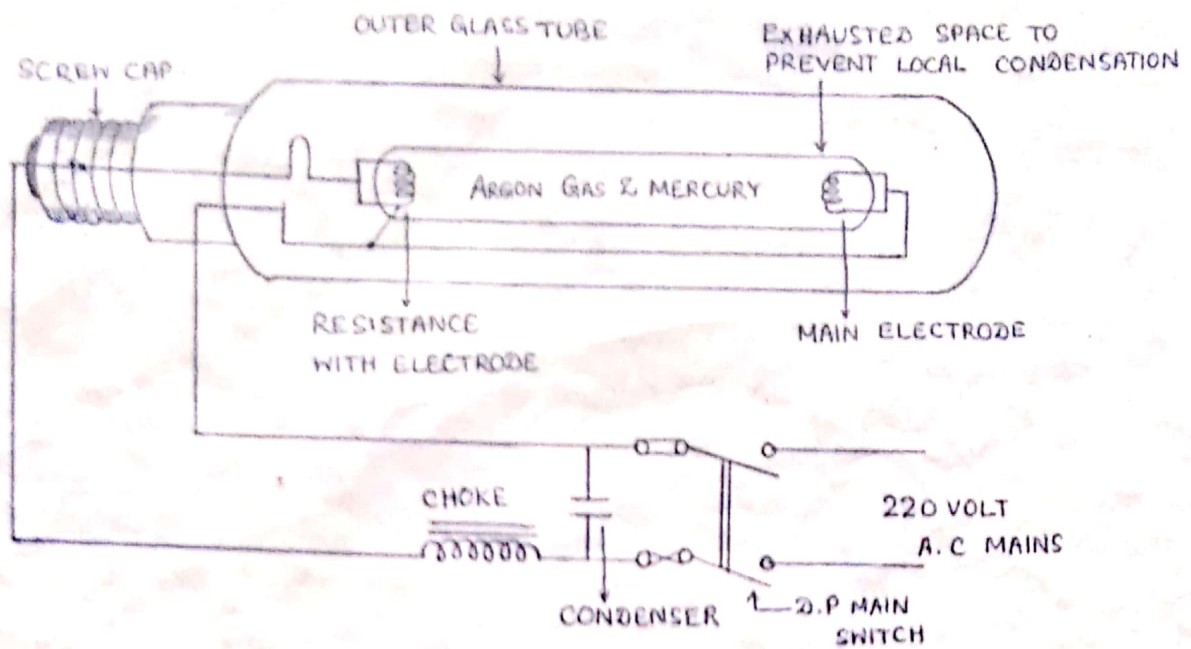
Sl. No.	Starting current in amp .	Running current in amp .
1		

PRECAUTION :-

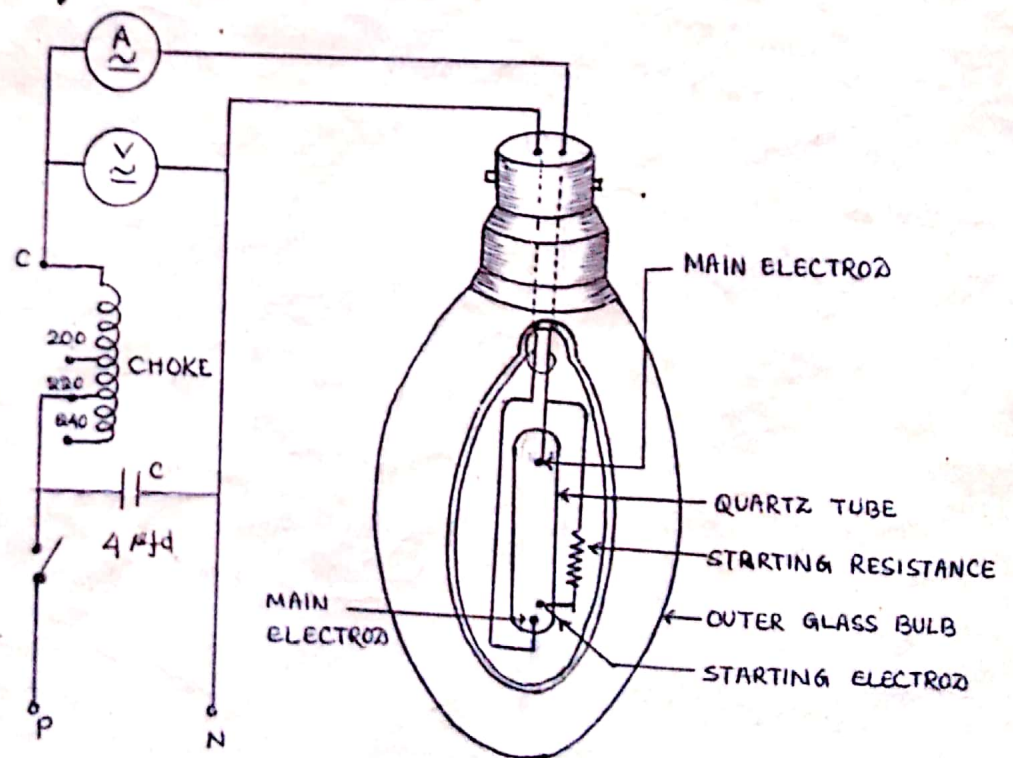
1. The connection should be right and tight.
2. Never give direct supply to the lamp.
3. Always use three cut holder.

CONCLUSION :- From this we able to connect the high pressure mercury vapour lamp with the A.C.supply.

- N.B:-**
1. H.P.M.V. lamp gives 2.5 times higher light than incandescent lamp.
 2. Available in different wattage like 80W, 125W, 150W, 250W, 400W & 1000W.
 3. It takes about 6 minutes to give full brightness .
 4. Barium oxide material is used for coating electrodes because it gives easy emission of electron .
 5. Its life period is about 5000 working hours .
 6. Efficiency is about 30 to 40 lumen/watt .
 7. Special 3-cut holder is used to hold the lamp .



ARRANGEMENT OF MERCURY VAPOUR LAMP



CONNECTION OF A MERCURY VAPOUR LAMP

SODIUM VAPOUR(S.V) LAMP

AIM OF THE EXPERIMENT :- To make connection for lighting & testing of sodium vapour lamp and to measure its starting and running current.

TOOLS & MATERIAL REQUIRED :

Sl. No.	Name of the items	Type	Range	Quantity
1	S.V. lamp	-----	-----	1
2	Choke for lamp	-----	-----	1
3	Ammeter	-----	-----	1
4	Holder for lamp	-----	-----	1
5	Switch	-----	-----	1
6	Connector screw driver	-----	-----	1
7	Combination plier	Insul ^{ld}	-----	1
8	Line tester	-----	-----	1
9	Connecting wire	S.W.G	-----	As per req.
10	Series testing board	-----	-----	1

INTRODUCTION :- A sodium vapour lamp is a cold cathode low pressure lamp which gives high luminous output about three times higher than other lamps .In this lamp the electrical discharge is caused in a "U" shaped glass tube filled with the neon gas and a small quantity of sodium . The ends of the tube contain electrodes .Since there is great effect of the change of temperature on the light given by the lamp ,the "U" shaped tube is enclosed in an outer doubled walled glass tube .

WORKING:- When cold sodium is in solid state and hence the lamp can not be started direct as sodium vapour lamp .For this purpose neon gas is inserted in the tube .To start the discharge through the lamp ,it is essential that the striking voltage should be higher than normal working voltage of he lamp. This high voltage is obtain from a high reactance transformer or auto- transformer. At first the discharge occurs in the neon (lamp giving radish light) rises and vaporizes the sodium producing a bright yellowish light. When discharge in the lamp takes place, the lamp current increases due to decrease in resistance of gas in tube and the output voltage of the transformer falls. The lamp then continues to operate normally.

PROCEDURE :-

1. Connect the sodium vapour lamp, choke and holder as per connection diagram .
2. Connect ammeter in series with the choke .
3. Give supply and put the switch 'on' and then note down the reading of the ammeter at starting. This gives the starting current.
4. After 5 minutes note down the reading of 'ammeter' which gives the running current.
5. Switch-off the supply to disconnect the lamp from supply .

TABULATION :-

Sl.No.	Starting current in amp .	Running current in amp .
1		

PRECAUTION :-

1. The connection should be right and tightly.
2. Never give direct supply to the lamp.
3. May use three cut holders or pendent holder.

CONCLUSION :- From this we able to connect the sodium vapour lamp v
A.C. supply.

- N.B.-** (i) The lamp takes about 10-15 minutes to give full light.
(ii) Average life period of the S.V. lamp is about 3000 working hours.
(iii) The luminous efficiency is about 40 to 50 lumens/ watt.
(iv) It is not affected by voltage variation.



DISMANTLING, REASSEMBLING AND TESTING OF AC CEILING FAN.

AIM OF THE EXPERIMENT :- To dismantle, reassemble and testing of AC ceiling fan.

TOOLS AND MATERIAL REQUIRED :-

Sl. No.	Name of the items	Type	Range	Quantity
1	Ceiling fan	A.C.	-----	1
2	Combination plier	Insulated	-----	1
3	Screw driver	-----	-----	1
4	Hammer	-----	-----	1
5	Test lamp	-----	200 W	1
6	Connecting wire	-----	-----	As per requirement.
7	Mobile oil	-----	-----	As per requirement
8	Greese	-----	-----	As per requirement
9	Nose pliers	Insulated	150mm	1
10	DE spanners.	-----	-----	Set
11	Empire sleeves	-----	4mm	As per requirement

INTRODUCTION :-

A C ceiling fan is simply an electric motor to which the blades are fixed so that, when the motor of the fan rotates, the blades throw the air. The rotating part of the fan is called '**ROTOR**' and the stationary part of the fan is called '**STATOR**'. The rotor is of squirrel case type. The stator consists of two windings, one main winding (running winding) and the other auxiliary winding (starting winding). Running windings of thick wire is wound in some half of the slots and the other starting winding of near about same thickness of wire is wound in the other half of the slots. A capacitor is connected in series with the starting winding. The capacitor and the starting winding remain in the circuit while the motor is even in full operation. The main winding and auxiliary winding are connected in parallel and one end is directly given to the supply(neutral) and the other through the speed regulator i.e. with phase.

The speed of the fans are controlled by speed regulators. The regulator is wound with eureka wire and consists of a number of resistance steps in series is connected to the fan motor in series of the supply. The applied voltage to the motor is varied by changing these resistance's, in steps and the fan works on the speed which we require.

PROCEDURE (For Dismantling and Reassembling)

To remove the fan from the ceiling when it is to be rewound or repaired, the following steps may be followed:-

1. Loosen the studs or screws fitted on the shank of blades with the upper cover of the ceiling fan. Remove them and the blades carefully so that angle/shape of the blades should not be disturbed.
2. Lower the upper canopy by unscrewing its machine screw and disconnect the connections from connector.
3. Loosen the nut of suspension bolt fitted in the 'U' shaped clamp of suspension rod, remove it and by holding/gripping the suspension rod into hands firmly, remove the bolt and down the fan carefully.

4. Unscrew the machine screw of lower canopy and set it upward.
5. Now disconnected the supply wires and fans motors connections from connector fitted-on the suspension rod or capacitor housing. Also disconnect the connections of capacitor and remove the capacitor.
6. Remove the split pin from suspension rod.
7. Unscrew the chuck nut and loosen the suspension rod and remove it from capacitor housing by holding the fan body and housing firmly.
8. Remove the split pin of housing, loosen the housing and remove it by holding the fan's body firmly.
9. Now loosen the machine screw of the bottom cover and remove it and remove the cover and chromium plated cup.
10. Remove the grease cup from underneath the chromium plated cup by unscrewing the machine screws.
11. Remove the back cover of motor by unscrewing the cover's screws with the help of wooden block and mallet etc.
12. Separate the Rotor.
13. Remove the upper cover by striking the shaft on a wooden Block.
14. Unscrew the machine screws of upper bearing cup. Remove the bearing cover.
15. Pull the bearing with the help of bearing puller.
16. Check the stator windings with the help of test lamp or megger set for open circuit, short circuit, earth or leakage fault separately.
17. Check also the two windings i.e. main and auxiliary (starting) wdg. for short circuit etc.
18. If the windings are short circuited or burnt then cut the coils with the help of hack saw blade, remove the burnt coils, clean the slots of the stator and rewind the stator by inserting the new insulating material and new coils of proper gauge of winding wire as per the turns. Do the connections of the coils i.e. main wdg. and starting wdgs separately very carefully and cover the wdgs. Coils with the help of cotton tape. Test the main leads of the motor of both windings i.e. main and starting wdg. Varnish the stator coils, bake it at 90 to 110° C and after cleaning the outer part of the stator, fit it in upper cover.
19. Complete the assembling of the parts of ceiling fan carefully and after doing all connections in the connectors hang it on the ceiling. Fix the blade and do the connections in the connector. Now the fan is ready.

Possible Faults

1. Open circuit, short circuit and earth fault in main winding or running winding.
2. Open circuit, short circuit and earth fault in auxiliary winding or starting winding.
3. Open circuit, short circuit and earth fault in capacitor or condenser.
4. Other faults may be in bearing or bushes, bent shaft, broken plug top or defective supply cord

Type of Tests

1. Continuity and short Circuit Test on Running Windings or Main Winding.

By connecting testing lead ends to R_1 and R_2 as shown in Fig. (a)

If the lamp glows dimly, it shows continuity.

If the lamp does not give light, it is an open circuit.

If the lamp glows brightly, it is a short circuit.

Removal of defects

In case of open circuit, connect the broken or disconnected ends of winding.

Separate the touching wires and varnish them in case of short circuit or if the coils are burnt, get them rewound.

2. Earth Test on Running Winding or Main Winding.

Connect one end of testing lead to the metal part of the fan and another end of testing lead to any one end of running winding as shown in Fig.(b). If lamp gives light, it is an earth fault.

Removal of Defect

Separate the bare wires from the metal part and insulated them by cotton tape or varnish them.

3. Continuity, Short and Earth Test on Starting or Auxiliary Winding and Capacitor.

Test them in the same way as you have tested running winding or main winding.

4. Short Circuit Test between Running Windings and Starting Winding.

By connecting testing leads to R_1 and S_1 as shown in Fig (c). if the lamp gives light it is a short circuit. Separate the touching wires and remove the fault by varnishing or by taping them.

PRECAUTION :-

1. The ceiling fan should be opened carefully .
2. Rotor should be taken out carefully .
3. Test main winding ,auxiliary winding and capacitor separately.
4. If there is short or open circuit fault in more than one coils ,then disconnect each coil and test them separately turn by turn.
5. Lead should be connected with connector terminals after testing them .
6. Capacitor(condenser) and the connections of the motor should be checked carefully.

CONCLUSION :- From this experiment we are able to dismantle , reassemble and find the defects in the A C ceiling fan.

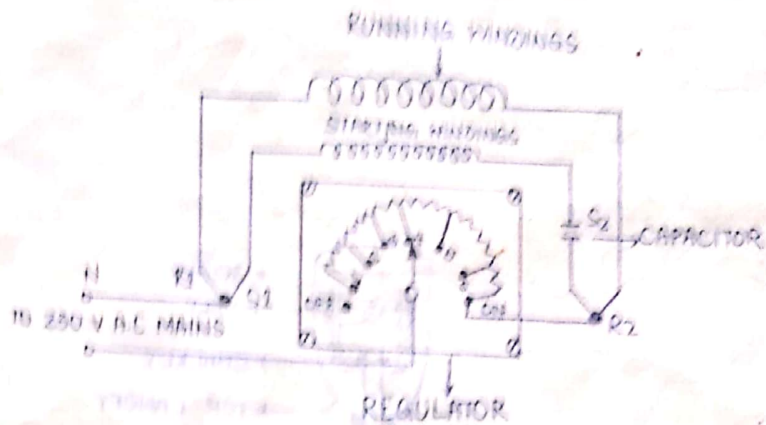


FIG. INTERNAL STRUCTURE OF CAPACITOR TYPE 230 V. AC CEILING FAN

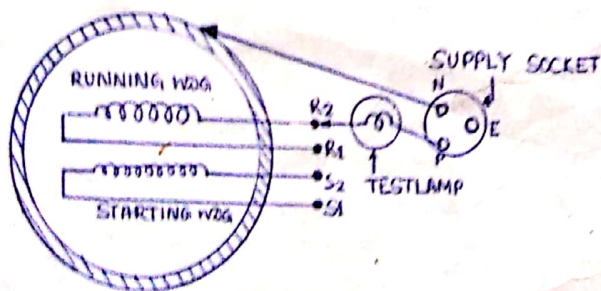
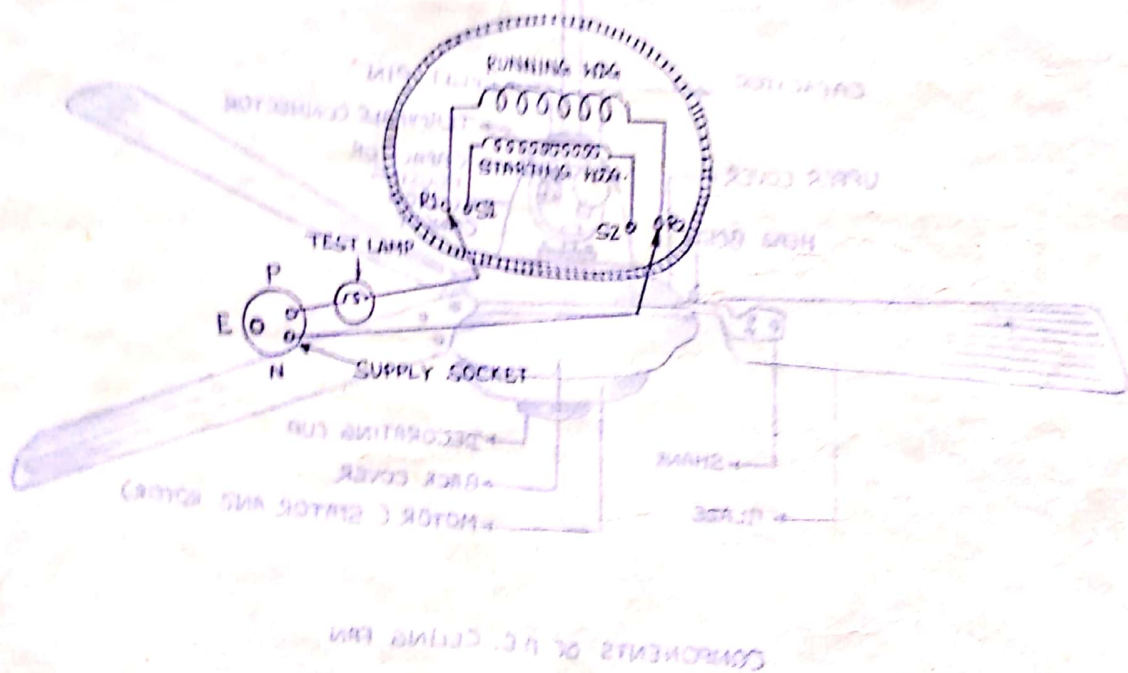


FIG. EARTH TEST IN RUNNING WINDING

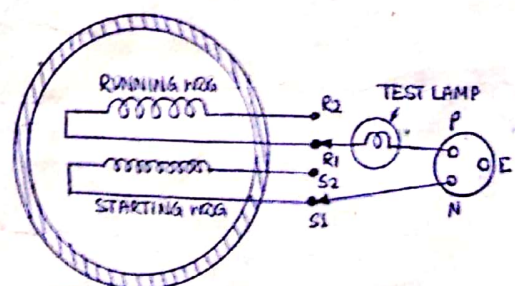
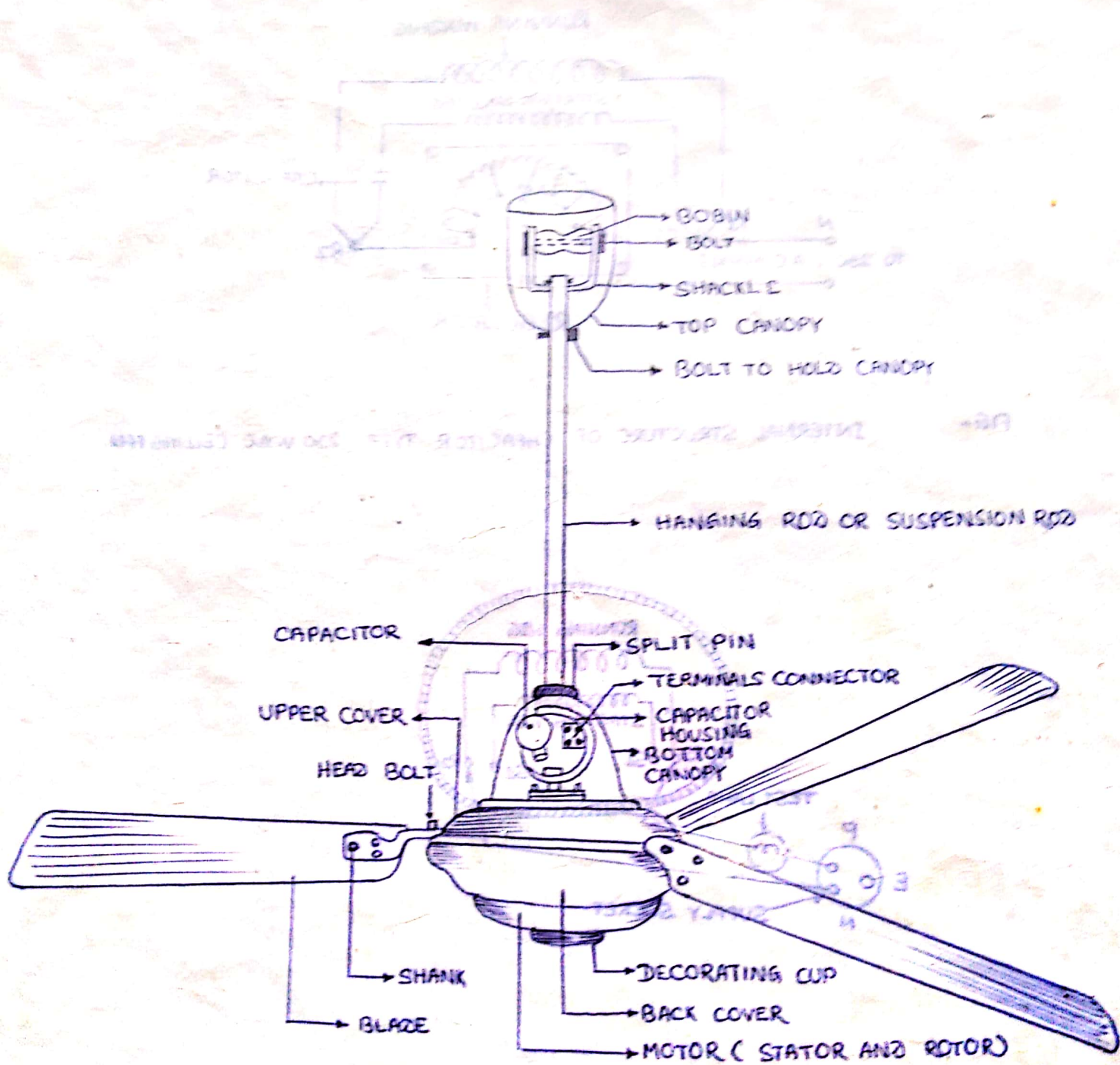


FIG. SHORT CIRCUIT TEST BETWEEN RUNNING WINDING AND STARTING WINDING



COMPONENTS OF A.C. CELING FAN

EXPERIMENT NO. 10

DATE : BRANCH : SECTION :

NAME : ROLL NO. :

REGD. NO. : MARKS : COMPLETE :

Sign. of Sr. Lect./Lecturer

AIM OF THE EXPERIMENT :

To Prepare an electrical Switch Board to Control Two Light Points, One Plug Point, One Fan Point and a Fuse for Main.

OBJECTIVES OF THE EXPERIMENT :

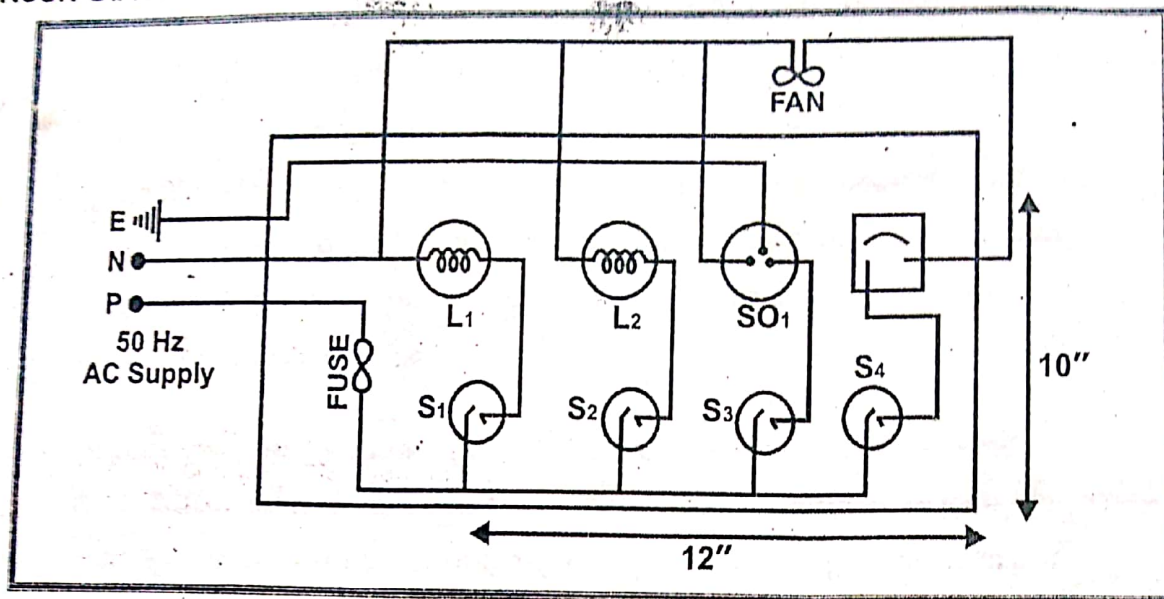
At the end of this Experiment, the students will able to :

- Make slots for fixing the switches, socket and fuse holder.
- Fix the components on the board firmly.
- Connect the board as per diagram.
- Prepare the list of components with specification.

Equipment / Materials Required :

SL. NO.	NAME OF THE EQUIPMENTS / MATERIALS	SPECIFICATION	QUANTITY
01.	Neon Tester	500 V	1 No.
02.	Test lamp (100W) with holder	100W/230V bulb	1 No.
03.	Insulated combination plier	200mm	1 No.
04.	Insulated Screwdriver	150mm	1 No.
05.	Electrician's Knife	75mm	1 No.
06.	Hand Drill Machine	As available	1 No.
07.	Wooden Switch Board	12" x 10"	1 No.
08.	PB / Flush type switch	5A/230V	4 nos.
09.	3-pin socket	5A/230V	1 No.
10.	Fan regulator	Solid or Resistive	1 No.
11.	Fuse holder	5A/230V	2 nos.
12.	Battery holder	5A/230	2 nos.
13.	Connecting wires for internal wirings	3/22 swg	As available
14.	Incandescent bulbs	100W	2 nos.
15.	PVC Tapes		1 roll
16.	Battery Type loop holder	19 mm size	1 No.

CIRCUIT DIAGRAM :



CIRCUIT DIAGRAM FOR SWITCH BOARD CONNECTION :

S_1, S_2, S_3, S_4 = 1 way 5A/230V switches

L_1, L_2 = 100 W/230V bulb (fitted in holder)

R = Regulator

F = Fuse holder

P = Live phase wire

N = Neutral wire

E = Earth wire

PROCEDURE :

- Collect all the components, materials and tools.
- Place all the switches and plugs etc on the top of the switch board and arrange them properly.
- Mark the slots on top of the Board with a marking pencil.
- Open the switch Board and drill with the help of drill machine at the mark given earlier.
- Fix the switches, plug sockets and fan regulator with screws.
- Scrap the insulation of the wires for the give! Length and connect as per the circuit diagram.
- Check loose connections at any terminal.
- Fix up, the Switch Board top after bringing out, the lead wire.
- Connect the supply through a switch.
- Fix up, the lamps in the holder.
- Switch "ON" the supply and test each lamp, plug and regulator points.

SAFETY AND PRECAUTIONS :

- Check minutely all the connections and ensure that there is no loose connection.
- Before fixing the Board, ensure that the wires are not overlapping each other.
- Use black tapes, if there is any breakage of insulation.