ORISSA SCHOOL OF MINING ENGINEERING, KEONJHAR

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DEPARTMENT OF ELECTRICAL ENGINEERING

LABORATORY MANUAL

ELECTRICAL MACHINE LAB - 1

(4th SEMESTER)

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(Lecture of Electrical Engineering)

DEPARTMENT OF ELECTRICAL ENGINEERING

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EXPERIMENTT- 1

AIM OF THE EXPERIMENT: Identification of different terminals of a DC machine by test Lamp Method & multi-meter method and to measure insulation resistance by megger.

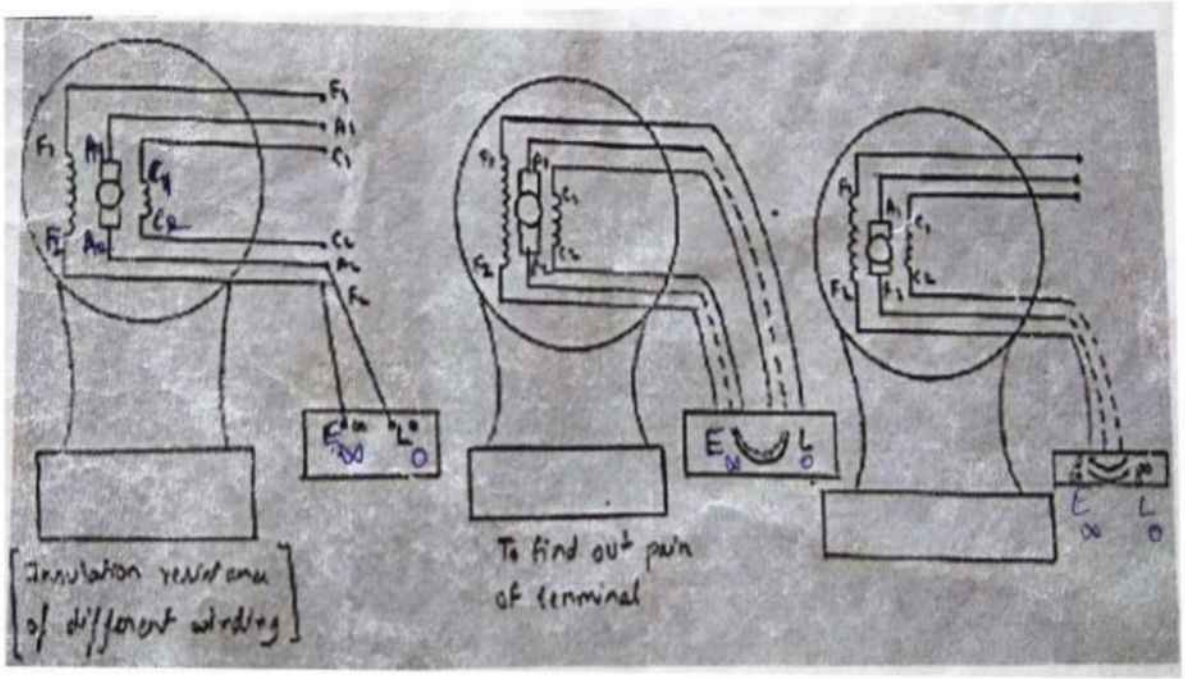
SL . NO	NAME OF EQUIPMENT	SPECIFICATION
01	DC COMPOUND WOUND MOTOR	220V,3KW,1500RPM,13.5A
02	MEGGER	50MΩ , (0-35)Ω
03	DIGITAL MULTIMETER	100AMP

THEORY:

A dc motor mainly consists of two windings as (a) Armature winding (b) field winding. In case of series dc motor field contain series winding only while shunt motor field contain shunt field winding but in case of compound wound dc motor field winding contain both series and shunt winding since each winding has two terminals in case of compound wound motor. There are three winding 6 terminals which located at top and attached with it.

To identify the terminals and measure the insulating resistance of the winding. Let consider a dc compound wound motor which has three winding and six terminals are kept in a terminal box and attached with a yoke or frame of the motor. The equivalent circuit diagrams of this motor with its terminals are given in the figure for observation point of view.

DIAGRAM:



INSULATION RESISTANCE TEST (BETWEEN WINDING AND BODY):

The aim of this test is that there should be no wire touching of the body. The "E" terminal of megger Is connected to the body and 1 terminal should touch the terminal of the generator or motor one by One and rotate the handle at 160 rpm. Note the reading.

INSULATION RESISTANCE TEST (BETWEEN DIFFERENT TERMINALS):

The aim of this test is to check that the winding which should be insulated from each other are Insulated or not. For this test touch the "E" terminal of the megger with shunt field winding F1&F2 Terminal and "1" terminal of the megger to armature terminal A1 & A2 and rotate the handle of the Megger. If the megger shows "infinite", it means that there is high resistance between two windings. If the megger shows zero it means that the both winding are short circuited with each other. Then test Between A1 or A2, C1 or C2, F1 or F2.

PROCEDURE:

a. We should take all the tools & instrument for this experiment.
b. Open the terminal box with the help of screw driver.
c. Disconnect the supply of DC shunt motor.
d. Switch ON the test lamp and connect the motor terminal according to the circuit Diagram.
e. Then measure the insulation resistance with the help of megger.
f. Note the insulation resistance of the motor.

TABULATION:

1.USING MULTIMETER:

SL.NO	NAME OF THE TERMINALS	RESISTANCE IN OHMS (Ω)
1	T-1 & T-4	1313 Ω
2	T-2 & T-4	6 Ω

2.USING MEGGER:

SL.NO	NAME OF THE TERMINALS	RESISTANCE IN OHMS(Ω)
01	$T\text{-}A^1$ & $T\text{-}A^2$	19.4 Ω
02	$T\text{-}C^1$ & $T\text{-}C^2$	0.7 Ω
03	$T\text{-}F^1$ & $T\text{-}F^2$	32.2 Ω

CONCLUSION:

From this experiment, we learnt about the identification of different terminals of a DC machine

EXPERIMENT:-2

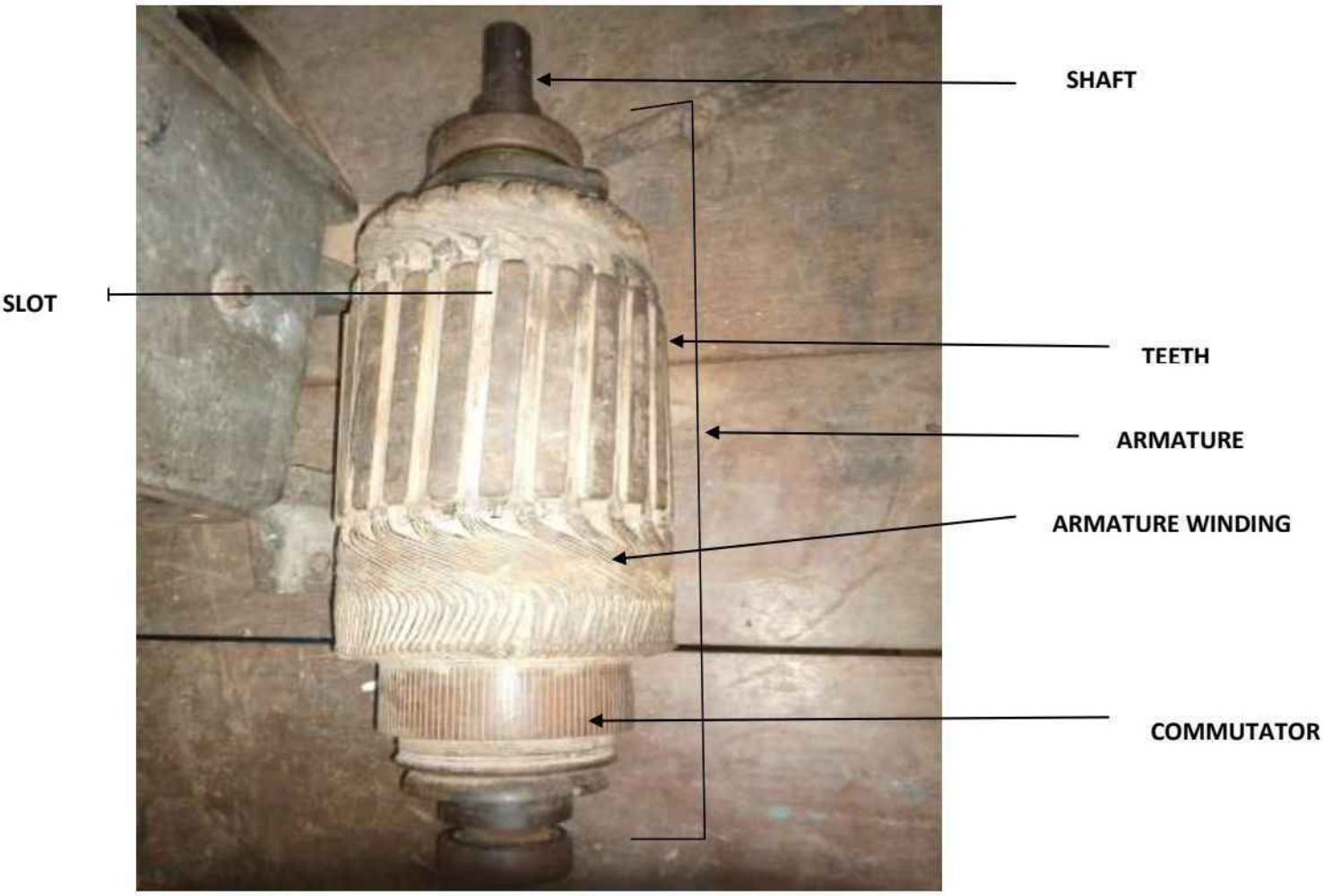
AIM OF THE EXPERIMENT:-Dimensional and material study of various parts of DC machine.

APPARATUS REQUIRED:-Simple model of a DC machine.

THEORY:-

DC MACHINE:-The machine which works on dc supply is called dc machine.


LIFT EYE
YOKE
COPPER WINDING
BRUSH HOLDER
POLE
SHOE
POLE



DC GENERATOR:-It is a device which converts mechanical energy into electrical energy.

DC MOTOR:-It is a device which converts electrical energy to mechanical energy.

PARTS OF DC MACHINE:-

(i)YOKE

(ii)POLE AND POLE SHOE

(iii)FIELD WINDING

(iv)ARMATURE CORE

(v)ARMATURE WINDING

(vi)COMMUTATOR

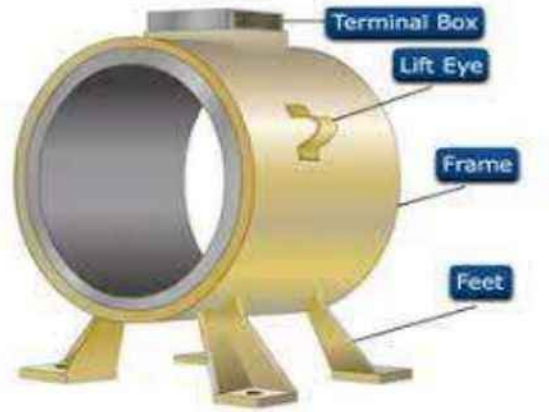
(vii)BRUSHES

(viii)SHAFT

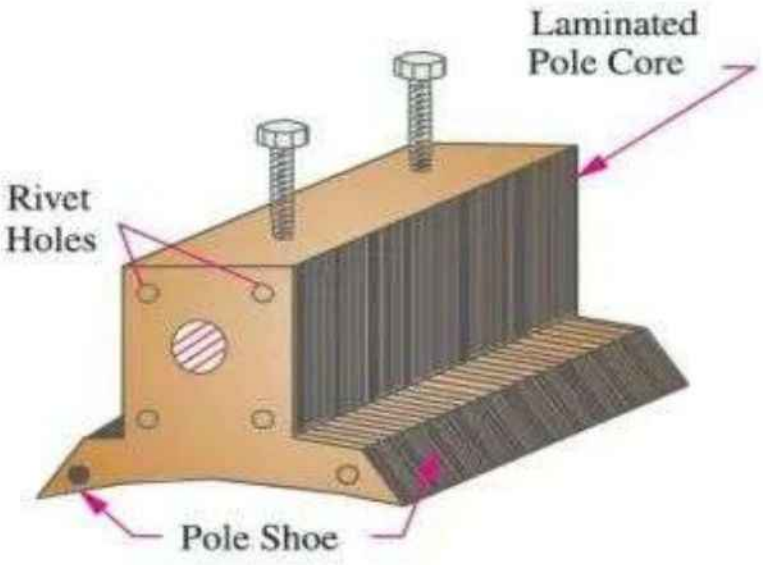
(ix)BASE

(x)NAME PLATE

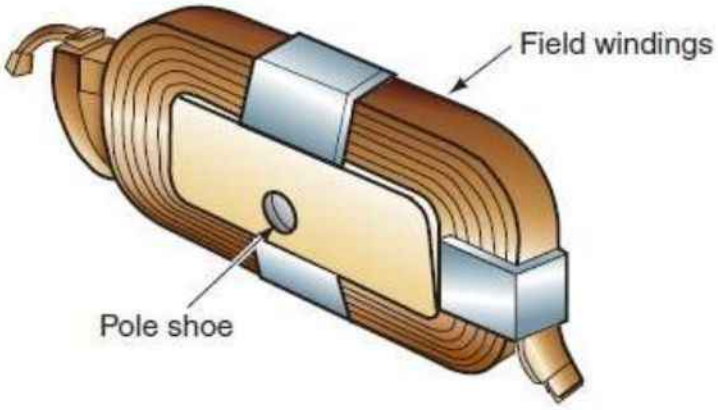
YOKE:-It provide mechanical protection for the pole and act as protecting cover for whole machine.It carry the magnetic flux produced by the core.It is made of cast iron or cast steel.



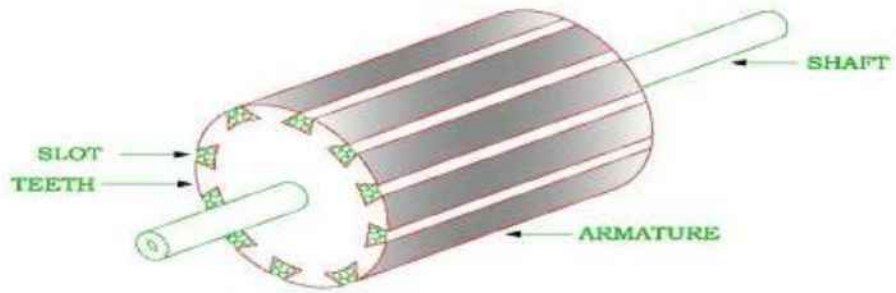
POLE CORE AND POLE SHOE:-The magnet consist of pole core and pole shoe.The pole shoe is used for distributing air gap and support the field winding.The pole core is made of cast steel or cast iron.It hold the field winding.



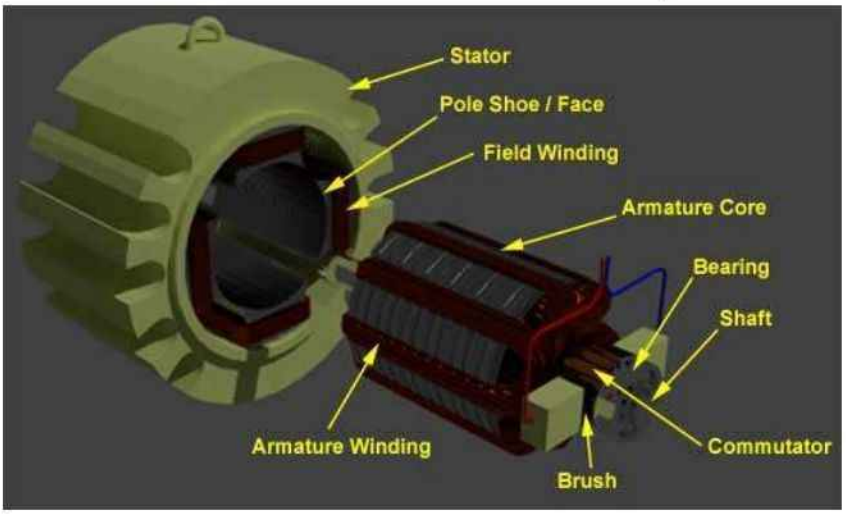
FIELD WINDING:-It is made of copper.When current is passed through the copper wire. They magnetised the pole which produced necessary flux.



ARMATURE CORE:-It is cylindrical in shape and it hold the armature conductor in it slot.

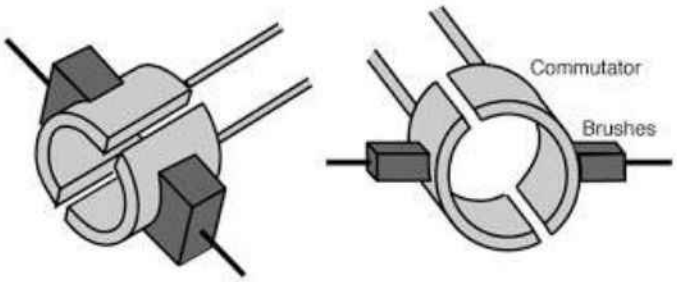


ARMATURE WINDING:-The armature winding are made with copper.It is also called conductor.The conductor are placed in the armature slots.



COMMUTATOR:-Its function is to convert the A.C to D.C current.It is made with copper.

BRUSHES:-It's function is to collect current from commutator and gives it the external supply.

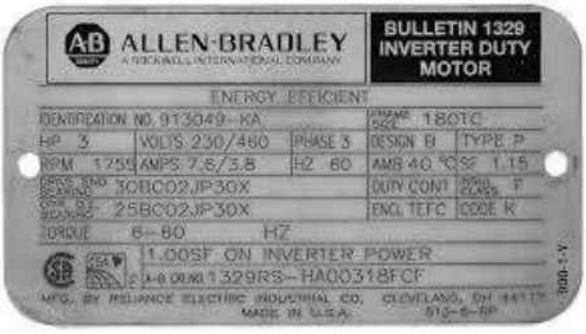


SHAFT:-It is a cylindrical component which converts energy from the motor into the end use application.

BASE:-It is a place where the dc machine is placed properly.It gives a tight grip to the machine.

BASE

NAME PLATE:-Defined parameter such as power factor,torque,current are at rated voltage and frequency.



CONCLUSION:-Hence we studied about D.C machine and its parts.

EXPERIMENT:-5

AIM OF THE EXPERIMENT:-STUDY OF THREE POINT STARTER ,CONNECT AND RUN D.C SHUNT MOTOR AND MEASURE THE NO LOAD CURRENT.

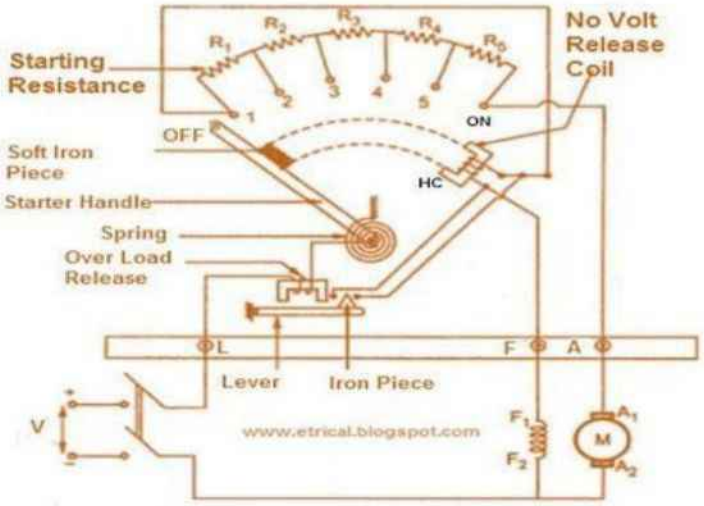
APPARATUS REQUIRED:

SL.NO	NAME OF THE EQUIPMENT	SPECIFICATION	TYPE	QUANTITY
1.	D.C SHUNT MOTOR	230V,1500RPM, 5KW	SHUNT	1
2.	3 POINT STARTER	230V		1
3.	AMMETER	0-20 A		1
4.	VOLTMETER	0-300 V		1
5.	PLIER	150MM		1
6.	CONNECTING WIRE			AS PER REQUIRED

THEORY:

THREE POINT STARTER IS A DEVICE THAT HELPS IN STARTING AND RUNNING THE SHUNT WOUND MOTOR.STARTERS ARE USED TO PROTECT D.C MOTORS FROM DAMAGE THAT CAN BE CAUSED BY VERG HIGH CURRENT DURING STARTUP.THEY DO THIS BY PROVIDING EXTERNAL RESISTANCE TO THE MOTOR,WHICH IS CONNECTED IN SERIES TO THE MOTOR'S ARMATURE WINDING AND RESTRICTS THE CURRENT TO AN ACCEPTABLE LEVEL.

DAIGRAM:-



CONSIST OF A VARIABLE RESISTANCE,HAVING A NUMBER OF CONTACT POINT OFF.1,2,3,4,5 CALLED AS STUDS. THERE ARE THREE TERMINALS IN 3 POINT STARTER:

- ‘L’ LINE TERMINAL (CONNECTED TO POSITIVE SUPPLY)
- ‘A’ARMATURE TERMINAL (CONNECTED TO ARMATURE WINDING)
- ‘F’ FIELD TERMINAL (CONNECTED TO FIELD WINDING)

POINT L IS FURTHER CONNECTED TO ELECTRO MAGNET CALLED OLR(OVER LOAD RELEASE).THE SECOND POINT OLR IS CONNECTED TO THE STRATER HANDLE.THE HANDLE IS FREE TO MOVE ON OTHER SIDE TOWARDS RUN AGAINST THE FORCE OF SPRING A SOFT IRON PIECE ATTACHED TO HANDLE.

- THE OVER LOAD COIL AND NO LOAD COIL ARE TWO PROTECTIVE DEVICES.

PROCEDURE:

1. CONNECT THE STARTER AS PER CIRCUIT DIAGRAM WITH DC SHUNT MOTOR.
2. CHECK ALL THE CONNECTION.
3. SWITCH ON THE DC AND START THE MOTOR WITH THE HELP OF STARTER.
4. NOW INCREASE THE STARTER HANDLE TO NO VOLTAGE COIL(NVC).
5. MEASURE THE NO LOAD CURRENT.

TABULATION:

SL NO	NO LOAD VOLTAGE	NO LOAD CURRENT
01	200V	1.5A

CONCLUSION:

HENCE WE STUDIED ABOUT THREE POINT STARTER.

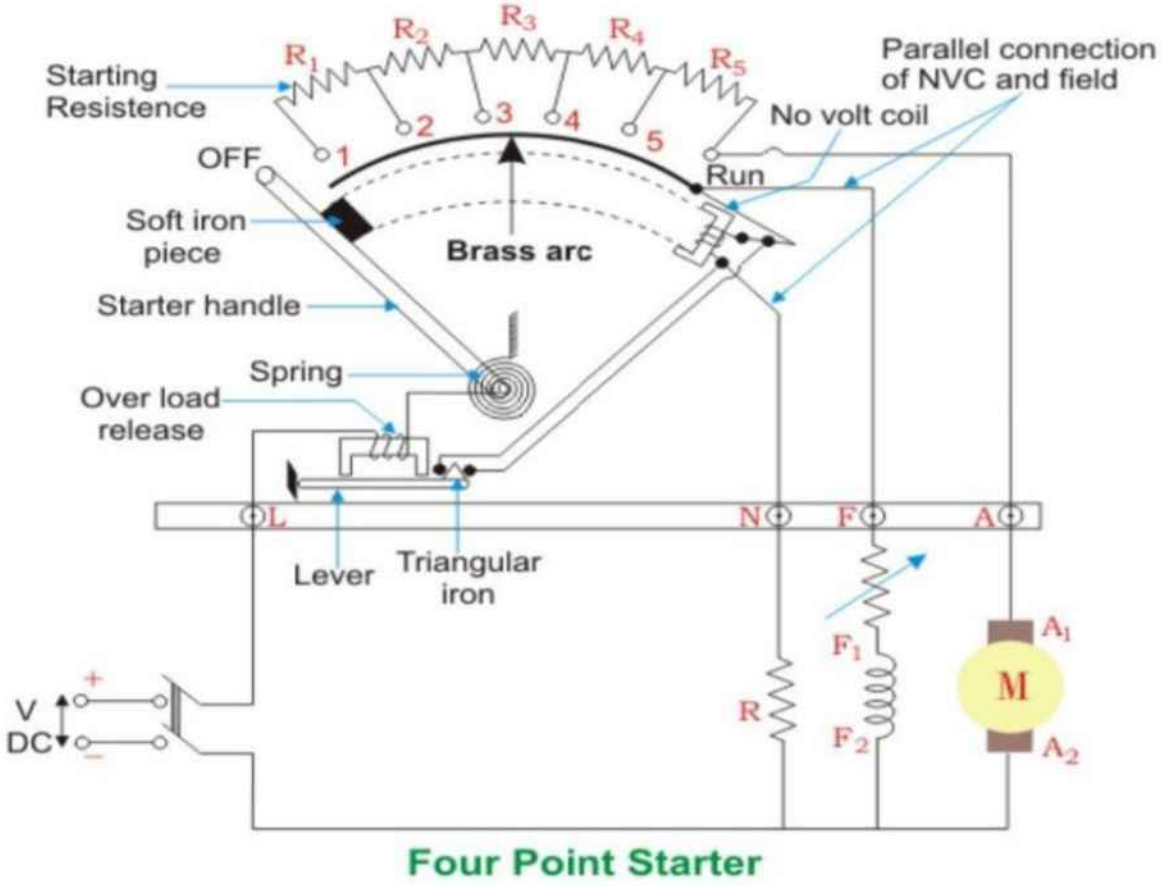
EXP-6

Aim:- Study of Four Point Starter, connect and run a DC compound motor & Measure no load current.

APPARATUS REQUIRED:-

SL NO	NAME OF THE EQUIPMENT	SPECIFICATIONS	QUANTITY
01	DC COMPOUND MOTOR	230v,1500 R.P.M,5KW	01
02	FOUR POINT STARTER	230V	01
03	DC AMMETER	(0-20)A	01
04	DC VOLTMETER	(0-300)V	01
05	CONNECTING WIRES		AS PER REQUIRED

CIRCUIT DIAGRAM:-



Four Point Starter

THEORY:-

Necessity of starter:-

(i) Starter is used to protect Dc motor from damage which can be caused by very high current and torque during starting.

(ii) Starting of DC motor, the armature is stationary, thus the back emf is also zero which is proportional to speed.

(iii) As armature resistance is very small, if the voltage is applied to it, it will drew many times of full load current.

(iv) This can cause heavy damage to the armature, so the starting current should be limited to a safe value.

(v) This can be done by inserting a resistance in series with the armature at the time of starting for a period of 5 to 10 secs.

Four- Point Starter:-

(i) It is used to start the dc compound motor.

(ii) It is similar to 3-point starter but here the holding coil is not connected in series with the shunt field.

(iii) It is connected across the supply in series with a resistor. This resistor limits the current in the holding coil to the desired value.

(iv) If the line voltage drops below the desired value, the magnetic attraction of the holding coil is decreased and then the spring pulls the starter handle back to the 'off' position.

Procedure:-

a. We should take all the tools & instrument for this experiment.

b. Connect the Starter as per circuit diagram with DC compound Motor.

c. Check all the connection.

d. Switch on the D.C. Supply start the motor with the help of starter.

e. Gradually increase the starter handle to the holding coil.

f. Measure the starting No load current.

Tabulation:-

SL.NO	NO_LOAD_VOLTAGE	NO LOAD CURRENT
01	200V	2.5A

Conclusion:-

Hence, we studied about the four point starter and measure the no.load current .

Exp No- 7A

Aim: - Control the speed of a Dc shunt motor by field flux control method.

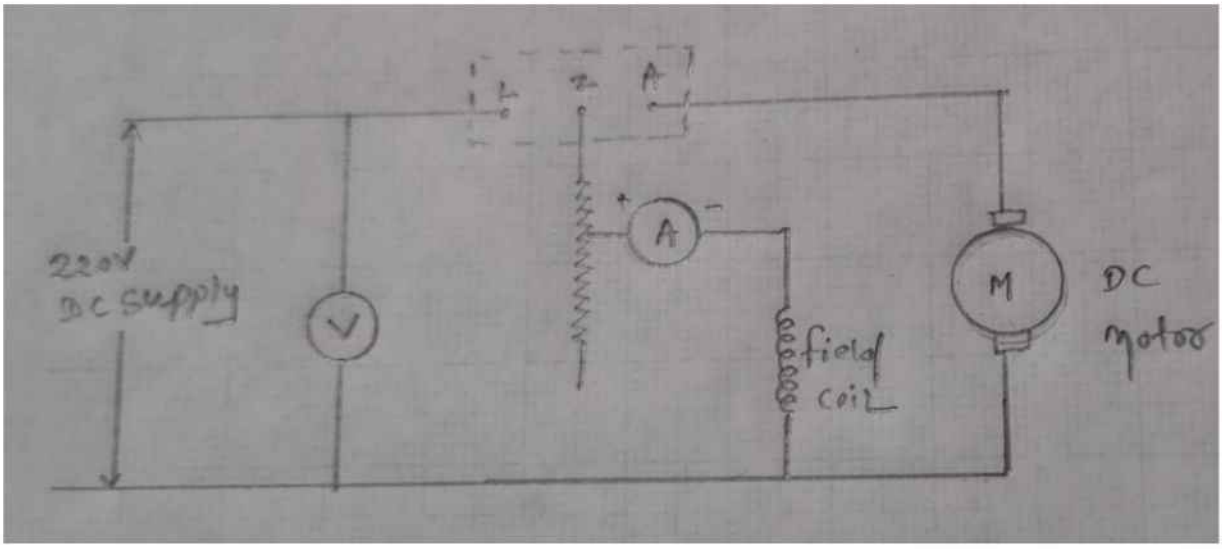
APPARATUS REQUIRED:

SL.NO	Apparatus	Range	Type	Quantity
01	Ammeter		DC	1
02	Voltmeter		DC	1
03	Rheostats		Wire wound	Each 1
04	Tachometer		Digital	1
05	Connecting Wires		Copper	As per required

PRECAUTIONS:

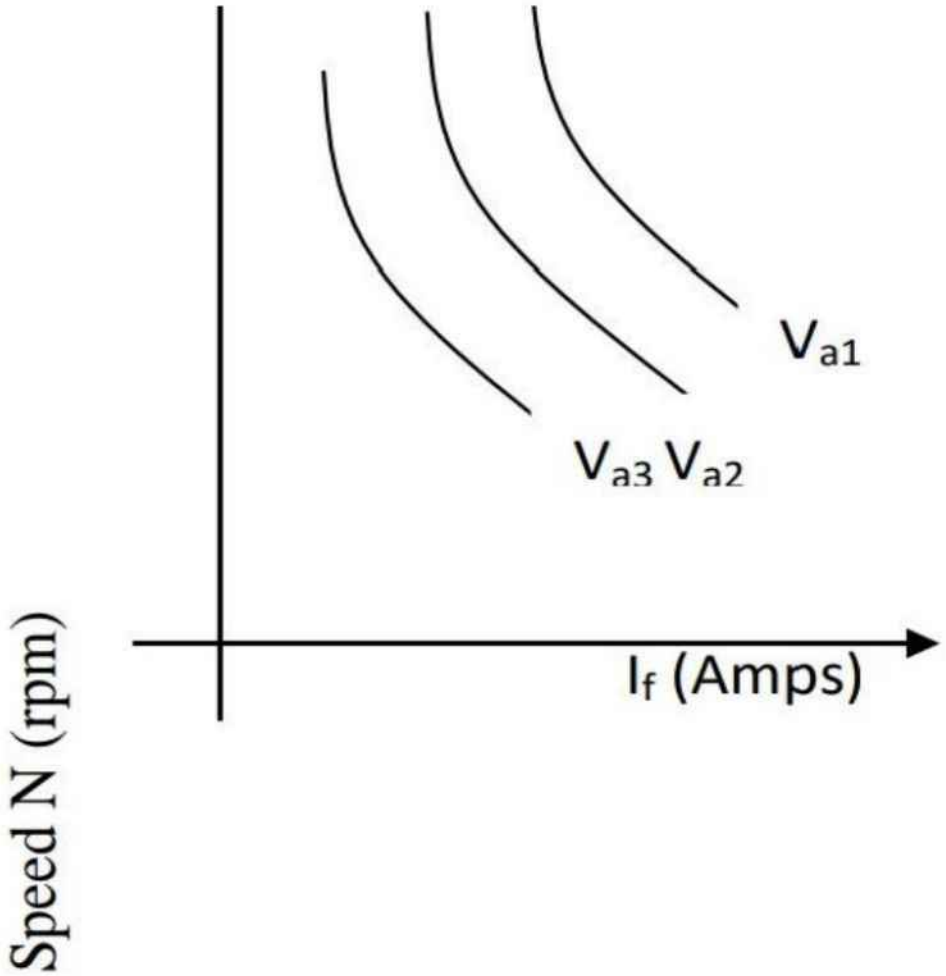
1. Field Rheostat should be kept in the minimum resistance position at the time Of starting and stopping the motor.

Circuit Diagram::



[Circuit Diagram of Field Flux control Method]

[Graph between speed and current]



TABULATION::

Field control method::-

SL.NO	Current If (in mA)	Speed(in r.p.m)
01	3.46	1470
02	3.31	1496
03	3.21	1510
04	3.11	1544
05	2.99	1564
06	2.89	1574
07	2.79	1616
08	2.69	1654
09	2.59	1674
10	2.49	1718

PROCPROCEDURE::-

1.Connections are made as per the circuit diagram.

2. After checking the minimum position of field rheostat, DPST switch is closed

Field Control:

1. Armature voltage is fixed to various values and for each fixed Value, by adjusting the field rheostat, speed is noted for various Field currents.
2. Bringing field rheostat to minimum position and armature Rheostatto maximum position DPST switch is opened.

Conclusion: From the above experiment, we have been obtained the speed control Characteristic curve of DC Shunt motor by Field control method.

EXPERIMENT NO ::7B

AIM OF THE EXPERIMENT: - Control the speed of a Dc Shunt motor by armature voltage control method.

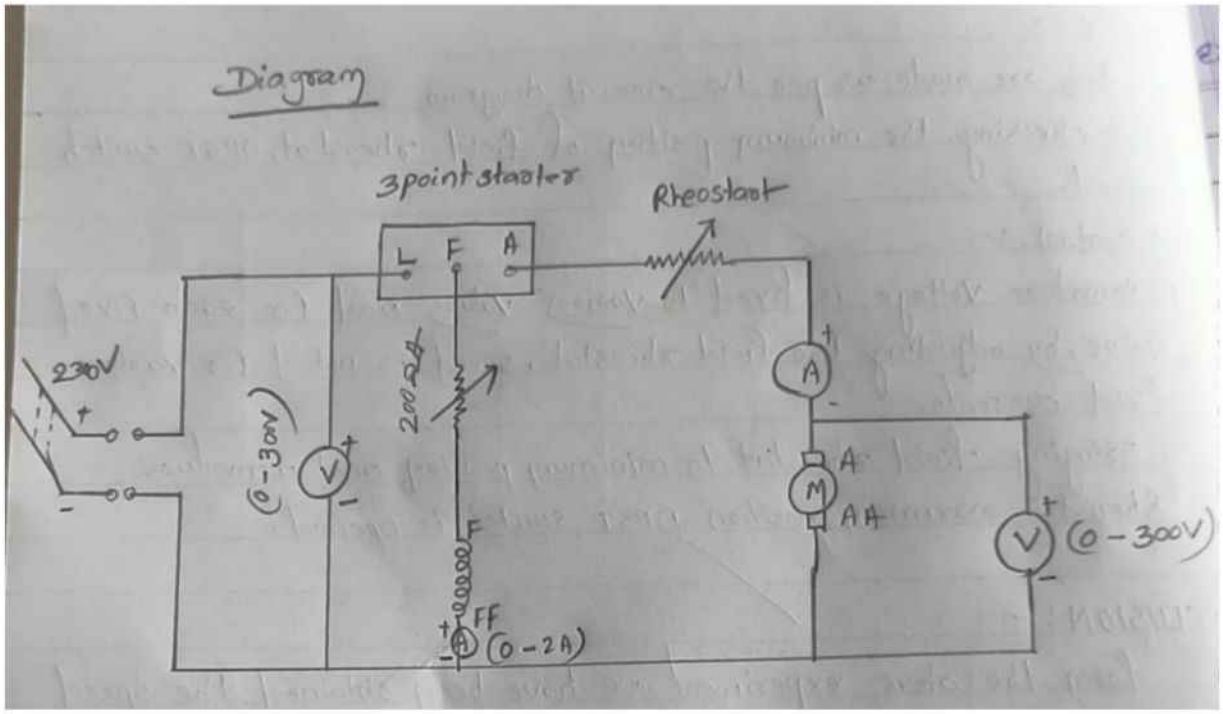
APPARATUS REQUIRED:

SL.NO	APPARATUS	RANGE	TYPE	QUANTITY
01	AMMETER	(0-20)mA	DC	01
02	VOLTMETER	(0-300)V	DC	01
03	RHEOSTATS	500ohm,1A	WIRE WOUND	EACH 1
04	TACHOMETER		DIGITAL	01
05	CONNECTING WIRES		COPPER	AS PER REQUIRED
06	DC SHUNT MACHINE	230V,5KW,1500 RPM,20A	DC SHUNT	01

PRECAUTIONS:

Armature Rheostat should be kept in the maximum resistance position at the time of starting and stopping the motor.

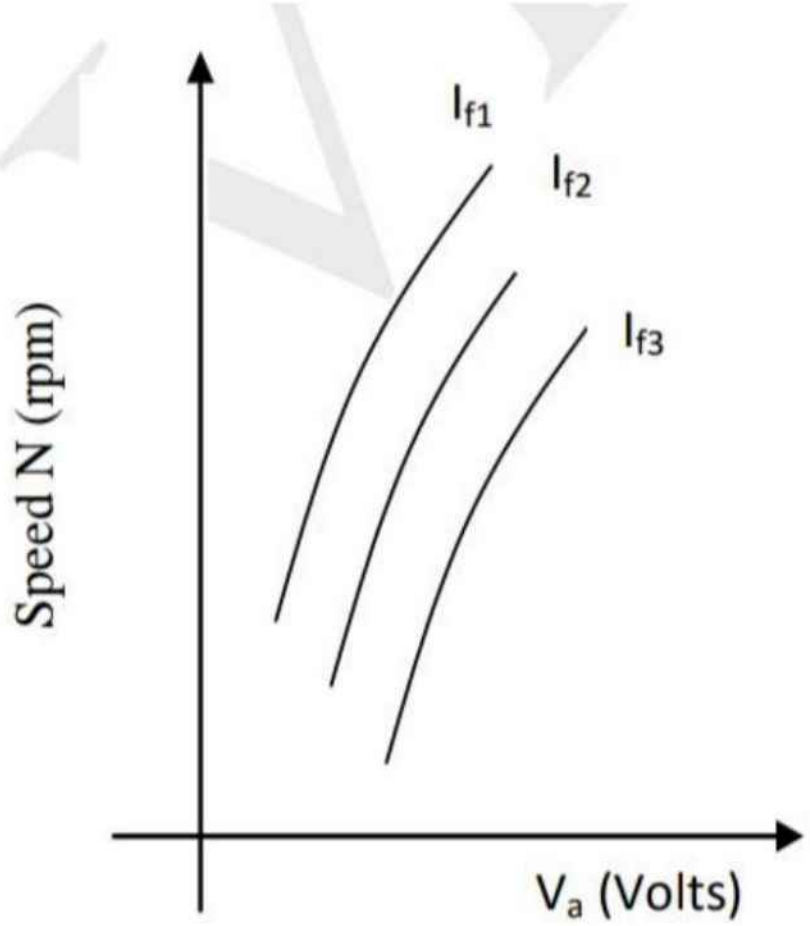
DIAGRAM::-

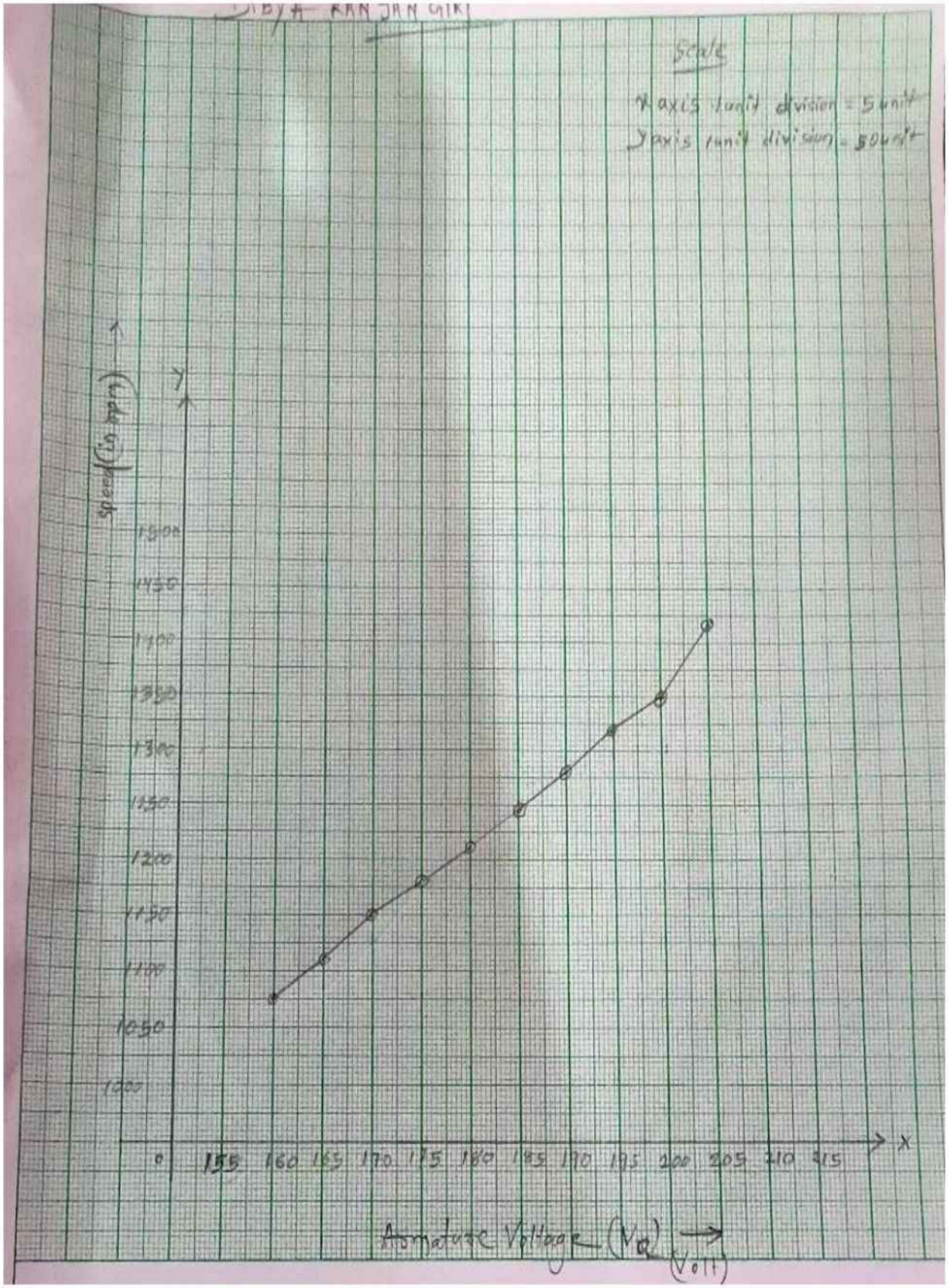


THEORY::-

The DC motor works on the principal that when a current carrying conductor is kept in the magnetic field,a force is produced on the conductor in a definite direction.The motors are designed to operate at a definite speed but many times in the industries,it is necessary to change the speed of the motor above normal or below normal of the rated speed.the specially of DC motor in comparison with AC motor is that the speed controlling method of DC motor are very simple and easy

GRAPH FOR ARMENTURE VOLTAGE CONTROL METHOD::-




BIBYA RANJAN GIRI
Scale
X axis 1 unit division = 5 unit
Y axis 1 unit division = 50 unit
Y
Speed (in rpm)
1500
1450
1400
1350
1300
1250
1200
1150
1100
1050
1000
0
155
160
165
170
175
180
185
190
195
200
205
210
215
X
Armature Voltage (Va) → (Volt)

TABULATION::-

SL.NO	VOLTAGE (in volts)	SPEED(in R.P.M)
01	205	1415
02	200	1350
03	195	1320
04	190	1280
05	185	1245
06	180	1210
07	175	1180
08	170	1150
09	165	1110
10	160	1075

PROCEDURE:

1. Connections are made as per the circuit diagram.

2. After checking the maximum position of armature rheostat and minimum, switch is closed

Armature Control:

Field current is fixed to various values and for each fixed value, by varying the armature rheostat, speed is noted for various voltages across the armature.

Conclusion: From the above experiment, we have been obtained the speed control characteristic curve of DC Shunt motor by armature voltage control method.

EXPERIMENT:-8

AIM OF THE EXPERIMENT:-

Determine the armature current vs. speed characteristic of a DC motor.

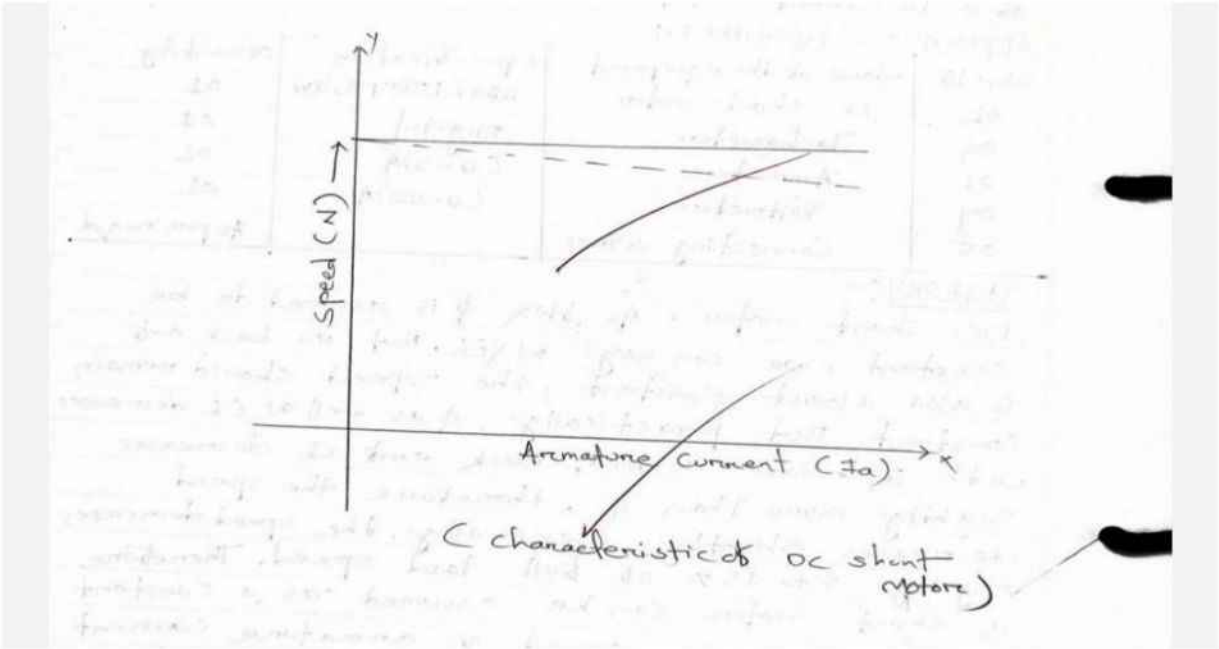
APPARATUS REQUIRED:-

SL.NO	NAME OF THE EQUIPMENT	SPECIFICATION	QUANTITY
01	DC shunt motor	200v,1500rpm,3kw	01
02	Tachometer	**Digital**	01
03	Ameter	(0-5A)	01
04	Voltmeter	(0-300v)	01
05	Connecting wires		As per required

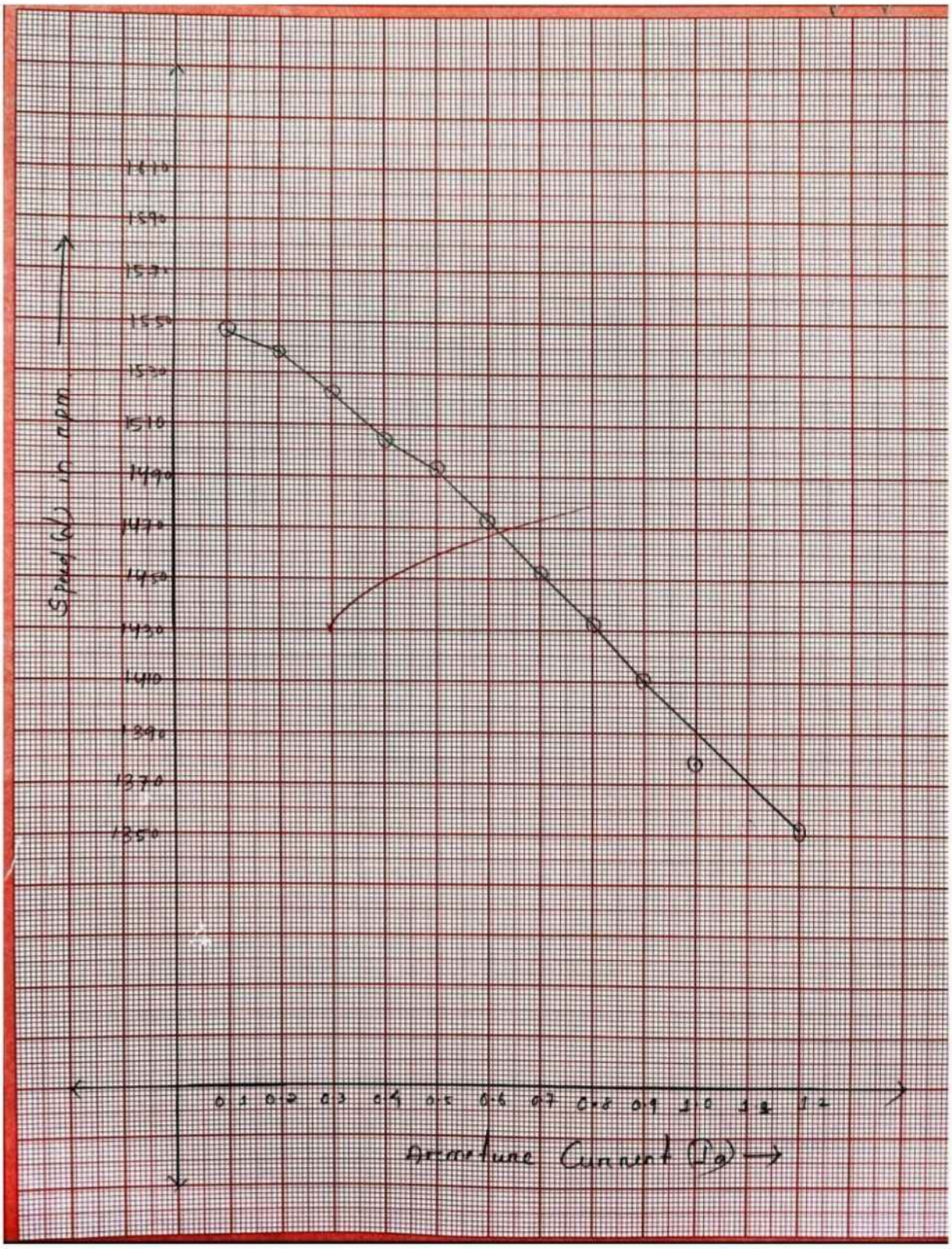
THEORY:-

DC shunt motor – As flux (fi) is assumed to be constant, we can say N*EB , But as back emf is also almost constant, the speed should remain constant, but practically, flux (fi) as EB decreases with increase in load ,back a map decreases slightly more than flux(fi) , therefore the speed decreases slightly. Generally, the speed decreases only by 5 to 15% of full speed, therefore a shunt motor can be assumed as a constant speed motor. In speed vs. armature current characteristics; the straight horizontal line represents the ideal characteristics and the actual characteristics is shown by the dotted line.

DIAGRAM:-



GRAPH PAPER DIAGRAM:-



PROCEDURE:-

1-Switch on the DC supply and start the shunt motor with the help of starter.

2-Gradually increase the starter handle to the holding coil.

3-Measure the current of DC shunt motor.

4-Measure the speed of DC shunt motor with the help of tachometer

TABULATION:-

SL.NO	ARMATURE CURRENT (Ia)	SPEED (N)
01	0.1	1546
02	0.2	1538
03	0.3	1522
04	0.4	1504
05	0.5	1492
06	0.6	1472
07	0.7	1452
08	0.8	1432
09	0.9	1410
10	1.0	1378
11	1.2	1352

CONCLUSION:-

From the above experiment, we have been obtained the graph of shunt motor of armeture current VS. Speed graph

EXPERIMENT :- 9

AIM OF THE EXPERIMENT:-

Determine the efficiency of a DC machine by brack test method .

APPARATUS REQUIRED:-

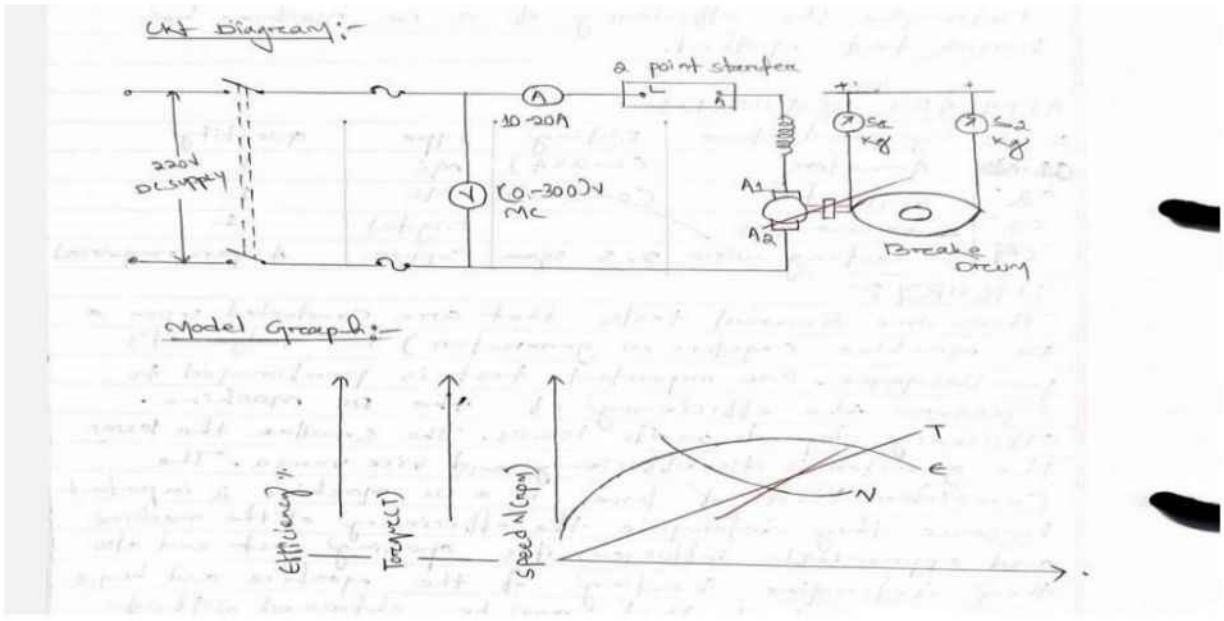
SL.NO	EQUIPMENT NAME	RATING	TYPE	QUANTITY
01	Ameter	(0-25A)	MC	1
02	Voltmeter	(0-300V)	MC	1
03	Tachometer		Digital	1
04	Connecting wire	2.5 Sq mm	Copper	As per Required

THEORY:-

There are several tests that are conducted upon a DC machine (motor or generator) to judge it's performance. One important test is performed to measure the efficiency of the DC machine. Efficiency depends on its losses. The smaller the losses the greater is its efficiency and vice versa. The consideration of losses in a DC machine is important because they determine the efficiency of the machine and applicable influences it's opening cost and also they determined heating of the machine and hence the power output that may be obtained without un due deterioration of the insulation. In this method a breakdown is connected in the shaft of the motor with spring balances to measure the load. The mechanical output of the motor is calculated with the help of spring Balances readings & speed of the machine.

CIRCUIT DIAGRAM:-

Load test on DC series motor.



PROCEDURE:-

-Make the connection as per circuit diagram.

-Keep the field regulator of the motor at minimum resistance position

-At the time of starting check that the belt on the pulley is free , so that there is no load on the pulley.

-Start the motor slowly by using starter .

-Adjust the field regulator so that motor run at its rated speed.

-Applying load on the pulley gradually in steps by adjusting of tension of spring balance.

-Take the reading of the ameter and voltmeter and two spring balance readings and the speed for each step.

-Cool the pulley throughout the loading period by puring water.

-Construct the experiment, till full load of the motor reached.

CONCLUSION:-

From the above experiment, we learnt the load test on the given DC series motor was conducted and it's performance characteristics were drawn and the following conclusion can be given base on the performance curves.

EXP NO-10

Aim of the experiment: - Identification of terminals, determination of voltage transformation ratio of a single phase transformer.

APPARATUS REQUIRED:

SL NO	APPARATUS	RANGE	TYPE	QUANTITY
01	1-ϕ Transformer	1-ϕ,1KVA, (0- 230)V		01
02	Transformer Turn Ratio Tester	1-ϕ, (0- 230)V		01
03	Connecting Wires		Copper	As per required

Theory:-

Transformation Ratio (K) is defined as the ratio of the EMF in the secondary coil to that in the primary coil.

$K = E2/E1 = (4.44(\Phi m)fN2)/(4.44(\Phi m)fN1)$

Therefore,

$K = E2/E1 = N2/N1$.....(1)

Now,

V1 = E1 + voltage drop

E2 = V2 + voltage drop

Due to the resistance in the windings and some leakage flux, there is some loss in voltage. This is called as Voltage Drop.

But, in ideal case, voltage drop can be neglected.

Hence,

V1 = E1

E2 = V2

Hence,

E2/E1 = V2/V1.....(2)

Also, in a transformer, the power across the primary as well as the secondary winding is same.

Hence,

V1.I1 = V2.I2

V1/V2 = I2/I1……(3)

Now, combining (1), (2) & (3), we get,

K = E2/E1 = N2/N1 = V2/V1 = I2/I1

Where,

1 represents the primary coil

2 represent the secondary coil

E is emf in the respective coil

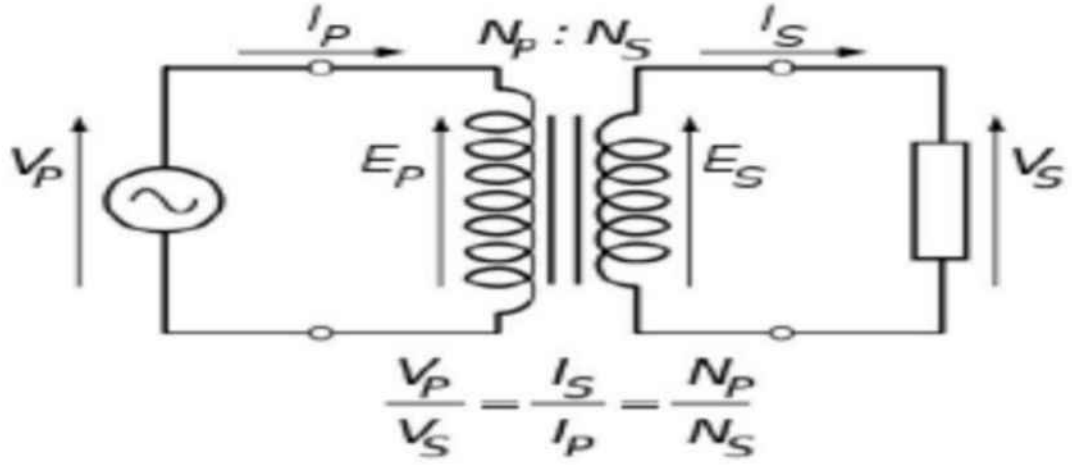
V is the voltage in the respective coil

I is the current in the respective coil

N is number of turns of the respective coils

Φm is the mutual flux in the core.

Diagram ::-



TABULATION:-

SL NO	Input voltage (V1)	Output voltage (V2)	Ratio (V2/V1=K)
01	233	2	
02			
03			
04			
05			

Procedure:-

1) Isolate the equipment, apply working grounds to all incoming and

outgoing cables and disconnect all incoming and outgoing cables from the transformer bushing terminals connections.

2) Disconnected cables should have sufficient clearance from the switchgear terminals greater that the phase spacing distance. Use nylon rope to hold cable away from incoming and outgoing terminals as required.

3) Connect the H designated three-phase test lead with the military style connector at one end to the mating connection on the test set marked with an H. Ensure that the connector's index notch lines up properly.

4) Connect the X designated three-phase test of lead military style connector at one end to the mating connection on the test set marked with an X. Ensure that the connector's index notch lines up properly.

5) Connect the H1, H2, H3 designated test lead to the corresponding H1, H2, H3 Transformer terminal / bushing. Connect the H0 test lead if H0 terminal/bushing is Present.

6) Connect the X1, X2, X3 designated test leads to the corresponding X1, X2,X3 Transformer terminals / bushings. Connect the X0 test lead if X0 terminal/bushing is Present.

7) Perform turns ratio measurements for all tap positions.

8) Confirm that the measured ratios is within 0.5% of the calculated ratios

Conclusion:-

From the above experiment, we learnt about the transformation ratio of Transformer.

EXPERIMENT:-11-A

AIM OF THE EXPERIMENT:-

Perform open circuit (oc) test of a single phase transformer.

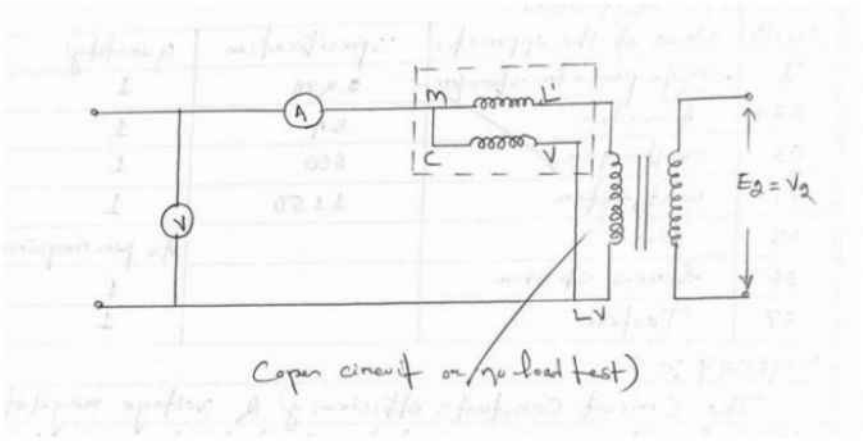
APPARATUS REQUIRED:-

SL.NO	***NAME OF THE EQUIPMENT***	***SPECIFICATION***	***QUANTITY***
01	*Single phase transformer*	*2KVA*	*01*
02	*Ammeter*	*5A*	*01*
03	*Voltmeter*	*600V*	*01*
04	*Wattmeter*	*1150W*	*01*
05	*Wire*		*As per required*
06	*Screw Driver*		*01*
07	*Tester*		*01*

THEORY:-

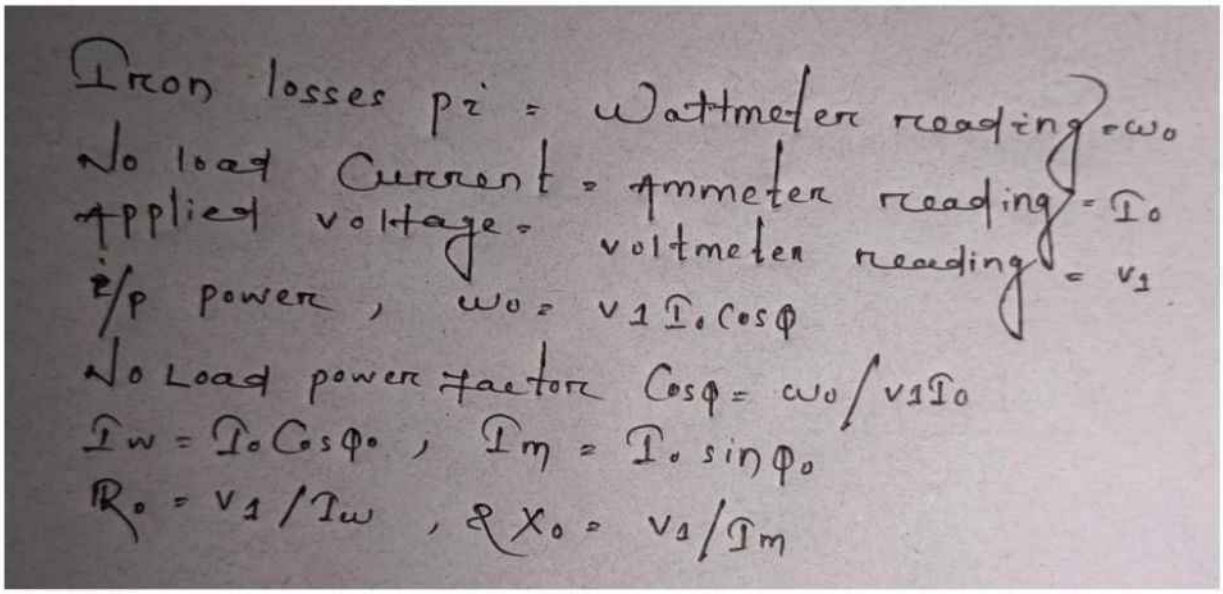
The circuit constant's efficiency & voltage regulation of a transformer can be determined by two simple test (I) open- circuit test & (ii) Short- circuit test . These test are very convenient as they provide the required information without actually loading the transformer . These test consist of measuring the I/p voltage , current & Power to the primary first with secondary open – circuit (open – circuit test) & then with the secondary short – circuit (short – circuit test).

DAIGRAM:-



OPEN – CIRCUIT OR NO LOAD TEST :-

This test is conducted to determine the iron losses (core losses) and parameters Ro & Xo of the transformer . In this test , the rated voltage is applied to the primary . while the secondary is left open – circuit . The applied primary voltage ⚡ Vt is measured by voltmeter , the no – load current Fo is measured by ammeter & no – load input power Wo is measured by wattmeter .As the normal rated voltage is applied to the primary , therefore, normal iron losses will occur in the transformer core . Hence wattmeter will record 🔲 the iron losses and small copper loss in the primary . Since no – load current Fo is very small, copper losses in the primary under no – load condition are negotiable as compared with iron loss . Hence wattmeter reading practically given the iron losses in the transformer.



PROCEDURE:-

1.At first give AC supply to the transformer.

2.Then measured V1 (primary voltage) , Io (No load current), Wo(Iron losses) wattmeter reading & tabulate it

TABULATION:-

SL NO	***SUPPLY VOLTAGE ⚡ V1 (IN VOLT)***	***NO-LOAD CURRENT Fo (IN AMP)***	***NO – LOAD POWER Wo (IN WATT)***
01	*225V*	*0.4A*	*40W*

CALCULATION:-

$V_1 = 225V$

$I_0 = 0.4A$

$W_0 = 40 watt$

$W_0 = V_1 I_0 \cos\phi_0$

$\Rightarrow 40 = 225 \times 0.4 \times \cos\phi_0$

$\Rightarrow \cos\phi_0 = \frac{40}{225 \times 0.4} = 0.44$

$\Rightarrow \phi_0 = \cos^{-1}(0.44)\ 63.89°$

$\Rightarrow \sin(63.89)° = 0.89 = \sin\phi_0$

$\therefore I_w = I_0 \cos\phi_0$

$= 0.4 \times 0.44 = 0.176A$

$I_m = I_0 \sin\phi_0 = 0.4 \times 0.89 = 0.356$

$\Rightarrow R_0 = \frac{V_1}{I_w} = \frac{225}{0.176} = 1278.4\Omega$

$\Rightarrow X_0 = \frac{V_1}{I_m} = \frac{225}{0.356} = 632\Omega$

CONCLUSION:-

Hence the open – circuit (OC) test enables us to determine iron losses & parameters Ro & Co pof the single phase transformer

EXPERIMENT:- 11-B

AIM OF THE EXPERIMENT:-

Perform short-circuit (SC) test of a single phase transformer.

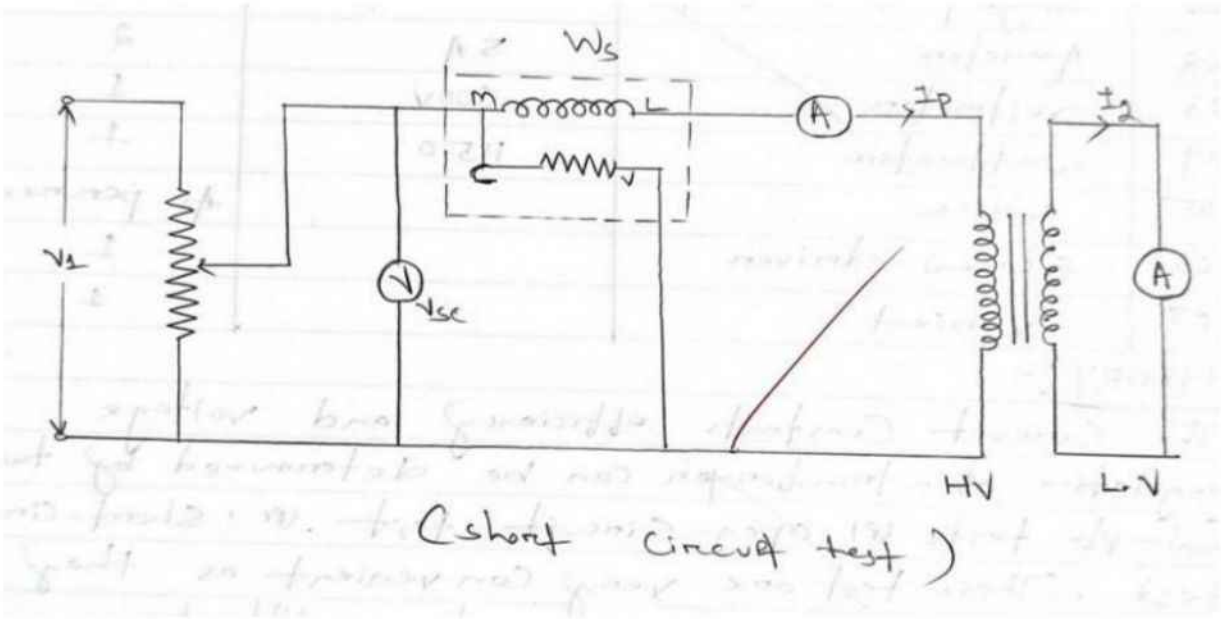
APPARATUS REQUIRED:-

SL.NO	NAME OF THE EQUIPMENT	SPECIFICATION	QUANTITY
01	Single phase transformer	2KVA	01
02	Ammeter	5A	01
03	Voltmeter	600V	01
04	Wattmeter	1150W	01
05	Wire		As per required
06	Screw Driver		01
07	Tester		01

THEORY:-

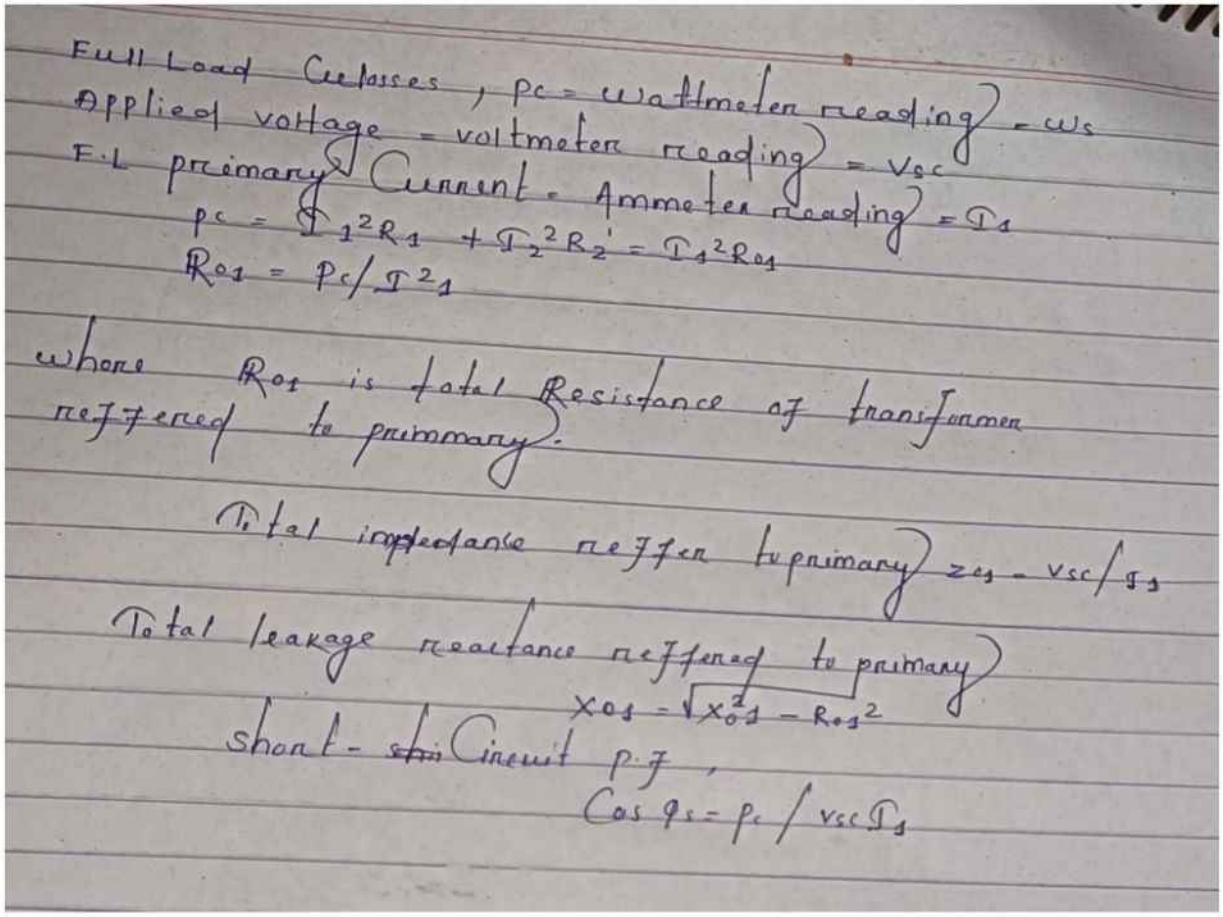
The circuit constant's efficiency & voltage regulation of a transformer can be determined by two simple test (I) open- circuit test & (ii) Short- circuit test . These test are very convenient as they provide the required information without actually loading the transformer . These test consist of measuring the I/p voltage , current & Power to the primary first with secondary open – circuit (open – circuit test) & then with the secondary short – circuit (short – circuit test).

CIRCUIT DIAGRAM:-



SHORT -CIRCUIT TEST :-

This tast is conducted to determine . Ro1 or (Ro2), Xo1 or (Xo2) and full-load copper loses of the transformer. In this test, the secondary (usually low voltage site) Is short circuited by a thick conductor and variable low voltage is applied to the primary. The low input voltage is gradually raised till at voltage Vsc , full load current Ff flows in the primary. The IS in the secondary also has full load value since Ff/I2 = N2/N1 , under such conditions, the copper lose in the winding is the same as that on full load. There is no output from the transformer under short circuited condition. Therefore input power is all losses and this losses is almost entirely copper loss, it is because Iron loss in the core is negligible small since the voltage Vsc is very small. Hence the wattmeter will practically register the full load copper loses in the transformer winding.



PROCEDURE:-

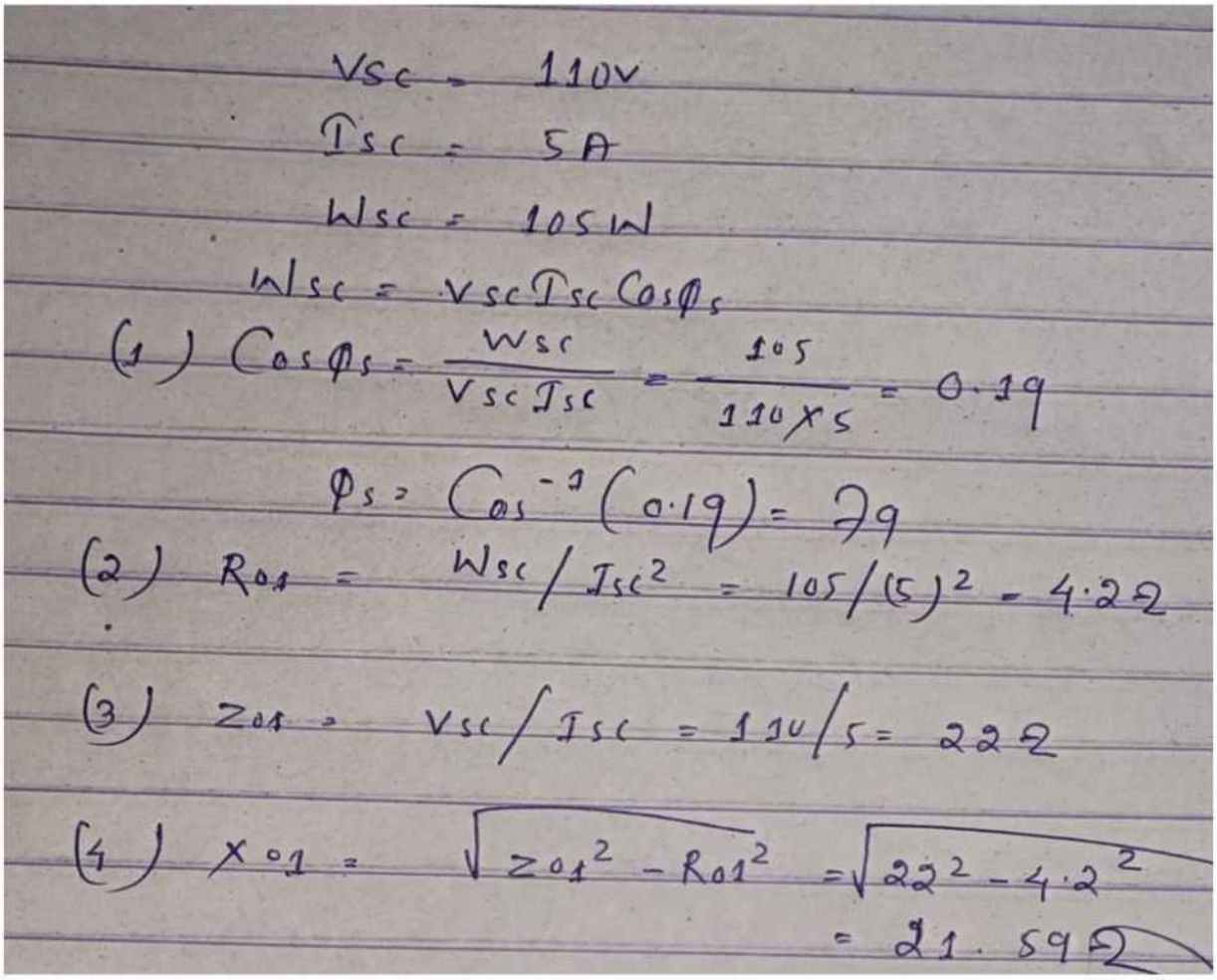
1.At first give AC supply to the transformer.

2.Then measured Vsc (Short -circuit voltage) ,Isc (short circuit current) ,Wsc wattmeter reading & tabulate it .

TABULATION:-

SL.NO	Vsc (IN VOLT)	Isc (IN AMP)	Wsc (IN WATT)
01	110V	5A	105W

CALCULATION:-



CONCLUSION:-

Hence the short circuit {SC} test enables us to determine copper loses & parameters Ro1 & Xo1 of the single phase transformer

THE END

(PREPARE BY:- DEPT. OF ELECTRICAL ENGINEERING)