Department of

Electrical Engineering

LAB MANUAL

ELECTRICAL MACHINES-1

B.Tech–3rd Semester

KCT College OF ENGG AND TECH. VILLAGE FATEHGARH DISTT.SANGRUR

LIST OF EXPERIMENTS

1. Open circuit and load characteristics of separately excited DC shunt generators
2. Open circuit and load characteristics of self excited DC shunt generators
3. Load test on d.c. shunt motor
4. Load test on d.c. series motor
5. Load test on d.c.compound motor
6. Speed Control of DC shunt motor.
7. SWINBURNE'S TEST
8. Load test on single-phase transformer
9. Open circuit and short circuit tests on single phase transformer
10. SEPARATION OF NO-LOAD LOSSES IN SINGLE PHASE TRANSFORMER

Ex. No: 1

Date:

Open circuit and load characteristics of separately excited DC shunt generators

AIM:

To obtain open circuit and load characteristics of separately excited DC shunt generator and to find its critical resistance

APPARATUS REQUIRED:

Sno	Apparatus	Range	Type	Quantity
1.	Voltmeter	(0-300)V	MC	1
2.	Ammeter	(0-2)A (0-20)A	MC	1
3.	Rheostat	300 Ω/ 1.5 A	-	2
4.	Loading rheostat	20 A	-	1
5.	Three point starter	-	-	1
6.	Connecting wires	-	-	Required

PRECAUTIONS:

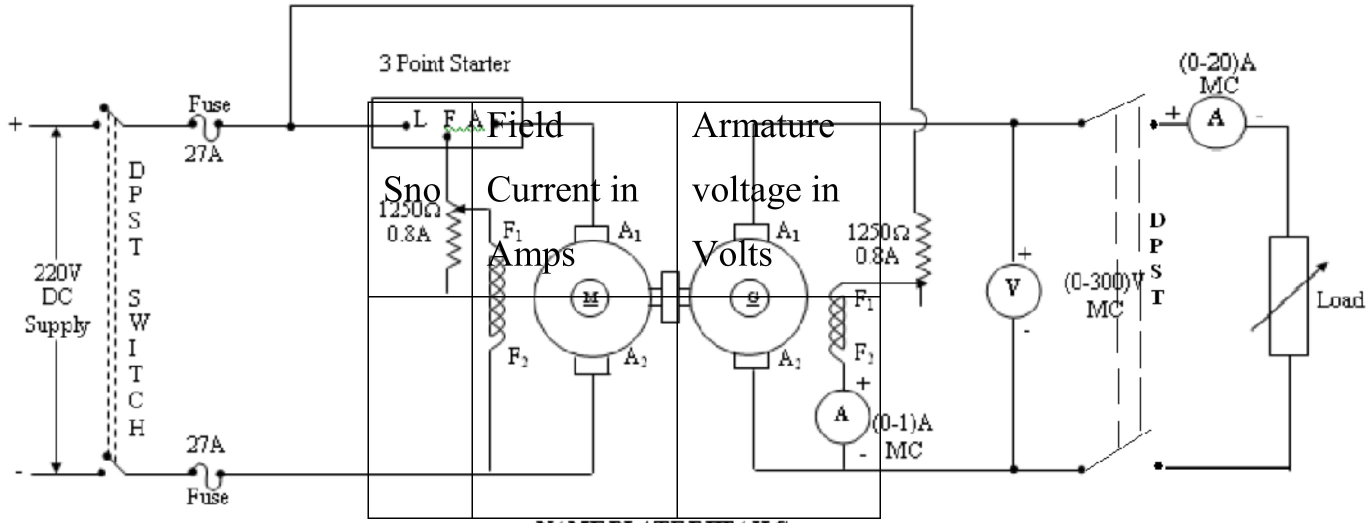
- Ensure that all the connections are tight.

- The field rheostat of motor should be in minimum resistance position at the time of starting and stopping the machine.
- The field rheostat of generator should be in maximum resistance position at the time of starting and stopping the machine.

PROCEDURE:

1. Connections are made as per the circuit diagram.
2. After checking minimum position of motor field rheostat, maximum position of generator field rheostat,
3. DPST switch is closed and starting resistance is gradually removed.
4. By adjusting the field rheostat, the motor is brought to rated speed.
5. Voltmeter and ammeter readings are taken
6. By varying the generator field rheostat, voltmeter and ammeter readings are taken for OCC characteristics
7. Vary the Generator field rheostat and keep the rated voltage.
8. Load is varied gradually and for each load, voltmeter and ammeter readings are noted for load characteristics.

CIRCUIT DIAGRAM:



Sno	Field Current in Amps	Armature voltage in Volts

FUSE RATING:

125% of rated current

125 x 21
---------------- = A

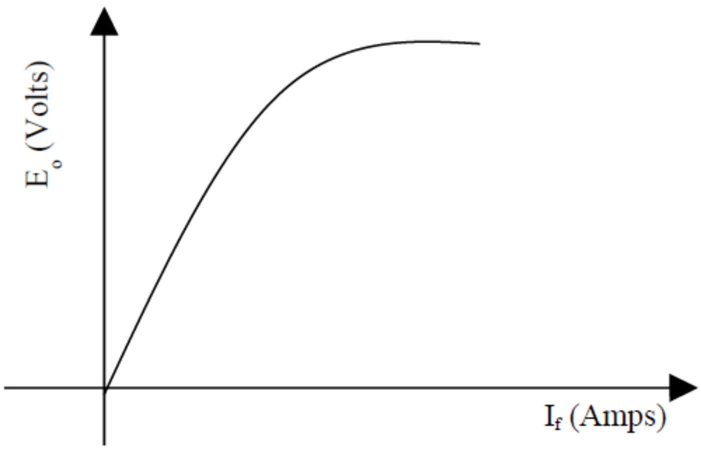
NAME PLATE DETAILS:

	Motor	Generator
Rated Voltage :		
Rated Current :		
Rated Power :		

OCC TEST

Tabular column:

OCC Characteristics:

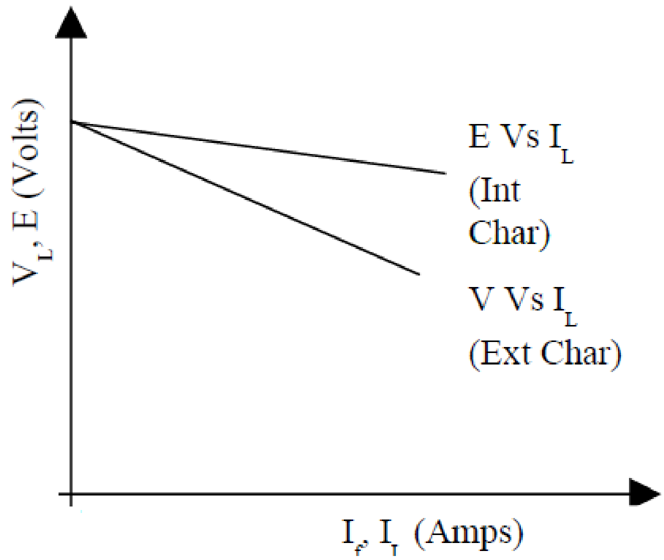


Load Characteristics:

R_a= _________ Ω

Load Characteristics:

S.No.	Field Current I_f (Amps)	Load Current I_L (Amps)	Terminal Voltage (V) Volts	$I_a = I_L + I_f$ (Amps)	$E_g = V + I_a R_a$ (Volts)


V_L, E (Volts)
E Vs I_L
(Int
Char)
V Vs I_L
(Ext Char)
I_f, I_L (Amps)

RESULT:

Thus the open circuit and load characteristics of separately excited Dc shunt generator is obtained

Ex. No: 2

Date:

Open circuit and load characteristics of self excited DC shunt generators

AIM:

To obtain open circuit and load characteristics of self excited DC shunt generator and to find its critical resistance

APPARATUS REQUIRED:

Sno	Apparatus	Range	Type	Quantity
1.	Voltmeter	(0-300)V	MC	1
2.	Ammeter	(0-2)A (0-20)A	MC	1
3.	Rheostat	300 Ω/ 1.5 A	-	2
4.	Loading rheostat	20 A	-	1

5.	Three point starter	-	-	1
6.	Connecting wires	-	-	Required

PRECAUTIONS:

- Ensure that all the connections are tight.
- The field rheostat of motor should be in minimum resistance position at the time of starting and stopping the machine.
- The field rheostat of generator should be in maximum resistance position at the time of starting and stopping the machine.

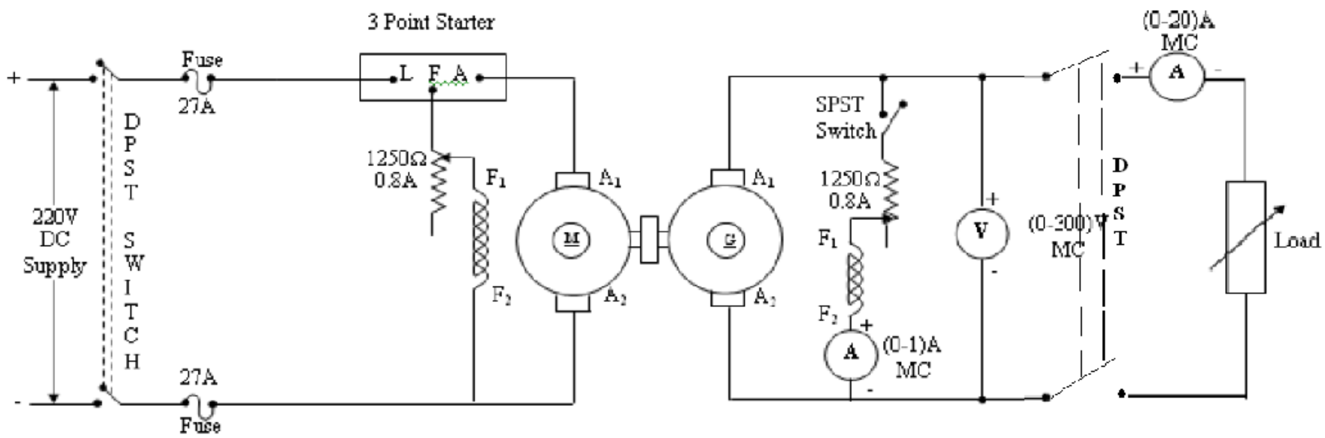
PROCEDURE:

1. Connections are made as per the circuit diagram.
2. After checking minimum position of motor field rheostat, maximum position of generator field rheostat,
3. DPST switch is closed and starting resistance is gradually removed.
4. By adjusting the field rheostat, the motor is brought to rated speed.
5. Voltmeter and ammeter readings are taken
6. By varying the generator field rheostat, voltmeter and ammeter readings are taken for OCC characteristics
7. Vary the Generator field rheostat and keep the rated voltage.

8. Load is varied gradually and for each load, voltmeter and ammeter readings are noted for load characteristics.

Sno	Field Current in Amps	Armature voltage in Volts

CIRCUIT DIAGRAM:



FUSE RATING:

125% of rated current

$$\frac{125 \times}{100} = \quad A$$

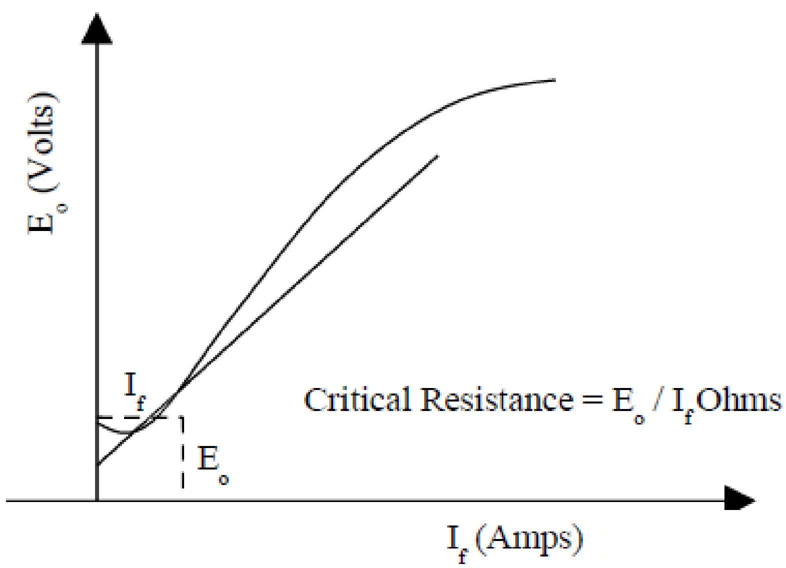
NAME PLATE DETAILS:

	Motor	**Generator**
Rated Voltage :		
Rated Current :		
Rated Power :		
Rated Speed :		

OCC TEST

Tabular column:

OCC Characteristics:

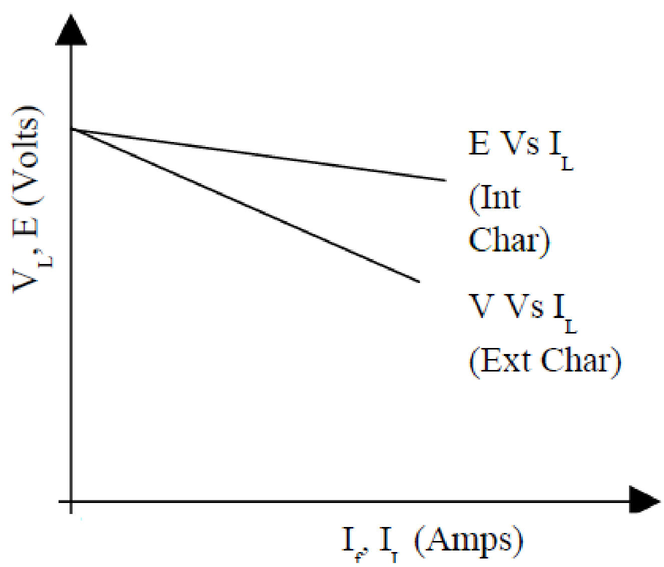


S.No.	Field Current I_f (Amps)	Load Current I_L (Amps)	Terminal Voltage (V) Volts	$I_a = I_L + I_f$ (Amps)	$E_g = V + I_a R_a$ (Volts)

Load Characteristics:

R_a= _________ Ω

Load Characteristics:



RESULT:

Thus the open circuit and load characteristics of self excited Dc shunt generator is obtained

Ex. No: 3

Date:

LOAD TEST ON D.C. SHUNT MOTOR

AIM:

To conduct load test on DC shunt motor and to find efficiency

Apparatus required:

Sno	Apparatus	Range	Type	Quantity
1.	Voltmeter	(0-300)V	MC	1
2.	Ammeter	(0-20)A	MC	1
3.	Rheostat	300 Ω/ 1.5 A	-	2
4.	Tachometer	(0-1500) rpm	Digital	1
5.	Connecting wires	-	-	Required

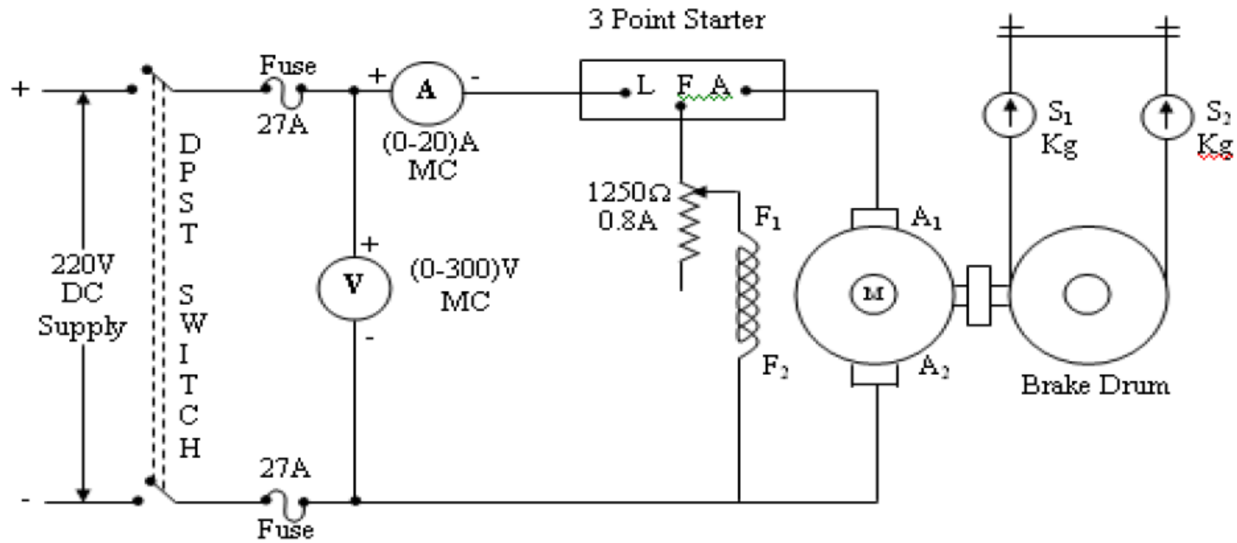
PRECAUTIONS:

- Ensure that all the connections are tight.
- DC shunt motor should be started and stopped under no load condition.
- Field rheostat should be kept in the minimum position.
- Brake drum should be cooled with water when it is under load..

PROCEDURE:

1. Connections are made as per the circuit diagram
2. After checking the no load condition, and minimum field rheostat position, DPST switch is closed and starter resistance is gradually removed.
3. The motor is brought to its rated speed by adjusting the field rheostat.
4. Ammeter, Voltmeter readings, speed and spring balance readings are noted under no load condition.
5. The load is then added to the motor gradually and for each load, voltmeter, ammeter, spring balance readings and speed of the motor are noted.
6. The motor is then brought to no load condition and field rheostat to minimum position, then DPST switch is opened

CIRCUITDIAGRAM



FUSE RATING:

125% of rated current

$$\frac{125 \times}{100} = \quad A$$

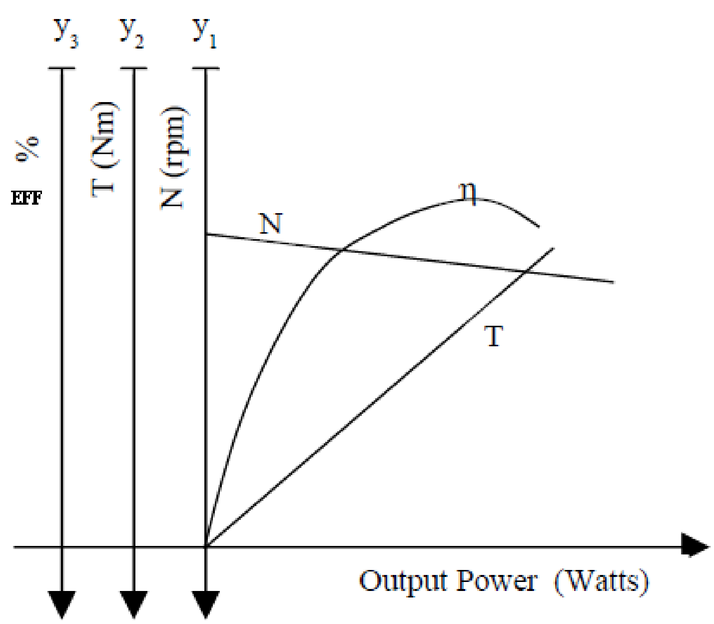
NAME PLATE DETAILS:

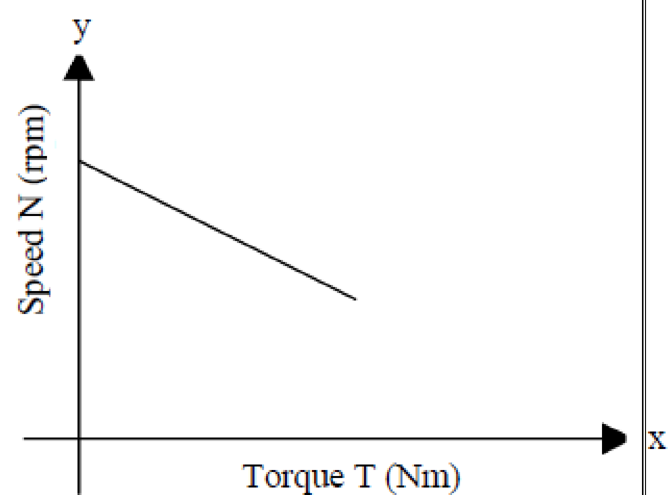
Rated Voltage :
Rated Current :
Rated Power :
Rated Speed :

Tabular Column:

SNO	Voltage In Volts	Current In Amps	LOAD		Torque T (Nm)	Speed N rpm	Input P_i watts	Output P_o watts	Efficiency η in %
			S_1 Kg	S_2 Kg					

Model graph:





Model Calculation:

Circumference of the Brake drum = ______ cm

$$R = \frac{circumference}{2\pi}\ metre$$

$$\boldsymbol{Torque = (S1 \sim S2) \times R \times 9.81\ Nm}$$

Input Power Pi = V×I Watts

$$\boldsymbol{Output\ power = \frac{2\pi NT}{60}\ Watts}$$

$$\boldsymbol{Efficiency\ \eta = \frac{output\ power}{input\ power}}\ \%$$

Result:

Thus load test on DC shunt motor is conducted and its efficiency is determined.

Ex. No: 4

Date:

LOAD TEST ON D.C.SERIES MOTOR

AIM:

To conduct load test on DC Series Motor and to find efficiency

Apparatus required:

Sno	Apparatus	Range	Type	Quantity
1.	Voltmeter	(0-300)V	MC	1
2.	Ammeter	(0-20)A	MC	1
3.	Tachometer	(0-1500) rpm	Digital	1
4.	Connecting wires	-	-	Required

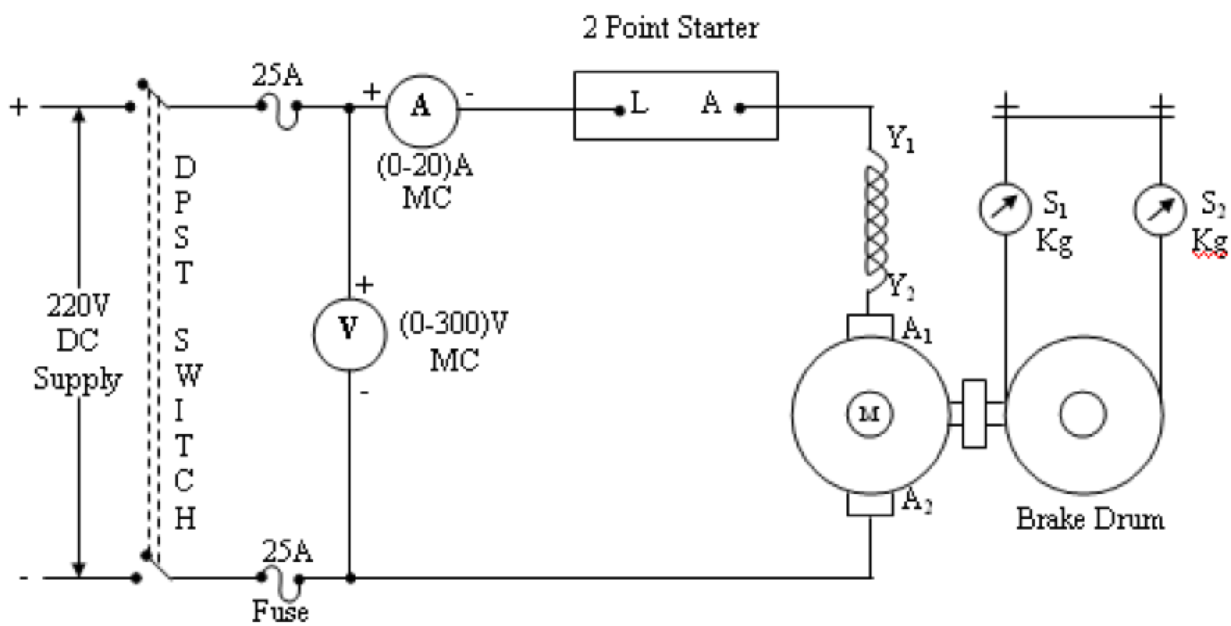
PRECAUTIONS:

- Ensure that all the connections are tight.
- The motor should be started and stopped with load
- Brake drum should be cooled with water when it is under load.

PROCEDURE:

1. Connections are made as per the circuit diagram.
2. After checking the load condition, DPST switch is closed and starter resistance is gradually removed.
3. For various loads, Voltmeter, Ammeter readings, speed and spring balance readings are noted.
4. After bringing the load to initial position, DPST switch is opened.

CIRCUIT DIAGRAM:



FUSE RATING:

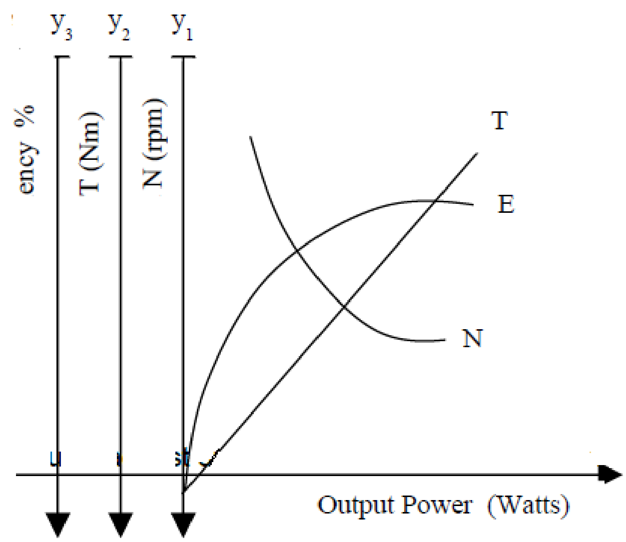
125% of rated current

$$\frac{125 \times}{100} = \quad A$$

NAME PLATE DETAILS:

Rated Voltage :
Rated Current :
Rated Power :
Rated Speed :

Model graph:



Tabular Column:

SNO	Voltage In Volts	Current In Amps	LOAD		Torque T (Nm)	Speed N rpm	Input P_i watts	Output P_o watts	Efficiency η in %
			S_1 Kg	S_2 Kg					

Model calculation:

Circumference of the Brake drum = ______ cm

$$R = \frac{circumference}{2\pi} \; metre$$

$$\boldsymbol{Torque = (S1 \sim S2) \times R \times 9.81\ Nm}$$

Input Power Pi = V×I Watts

$$\boldsymbol{Output\ power = \frac{2\pi NT}{60}\ Watts}$$

$$\boldsymbol{Efficiency\ \eta = \frac{output\ power}{input\ power}}\ \%$$

RESULT:

Thus load test on DC series motor is conducted and its efficiency is determined

Ex. No: 5

Date:

LOAD TEST ON D.C.COMPOUND MOTOR

AIM:

To conduct load test on DC compound motor and to find its efficiency

Apparatus required:

Sno	Apparatus	Range	Type	Quantity
1.	Voltmeter	(0-300)V	MC	1

2.	Ammeter	(0-20)A	MC	1
3.	Tachometer	(0-1500) rpm	Digital	1
4.	Rheostat	300 Ω / 1.5 Amps	-	1
4.	Connecting wires	-	-	Required

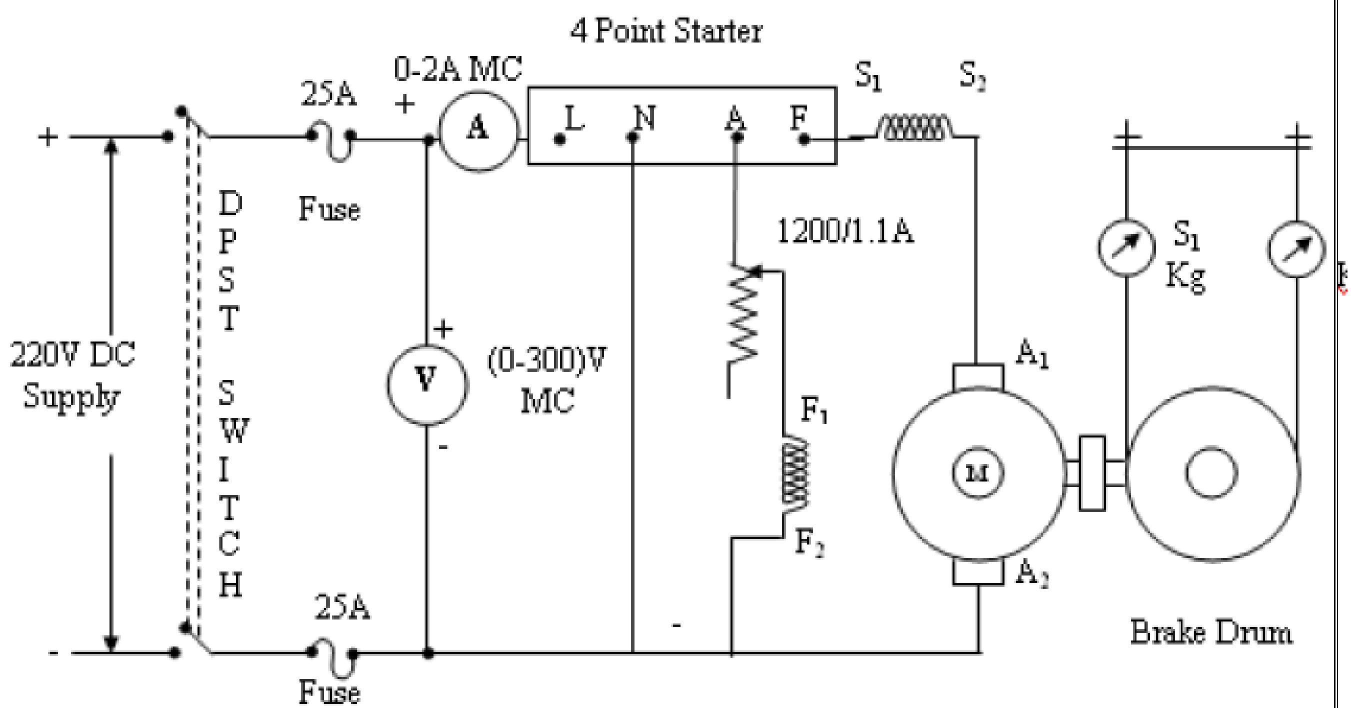
PRECAUTIONS:

- Ensure that all the connections are tight.
- DC compound motor should be started and stopped under no load condition.
- Field rheostat should be kept in the minimum position.
- Brake drum should be cooled with water when it is under load.

PROCEDURE:

1. Connections are made as per the circuit diagram.
2. After checking the no load condition, and minimum field rheostat position, DPST switch is closed and starter resistance is graduallyremoved.
3. The motor is brought to its rated speed by adjusting the field rheostat.
4. Ammeter, Voltmeter readings, speed and spring balance readings are noted under no load condition.
5. The load is then added to the motor gradually and for each load, voltmeter, ammeter, spring balance readings and speed of the motor are noted.
6. The motor is then brought to no load condition and field rheostat to minimum position, then DPST switch is opened.

CIRCUIT DIAGRAM



FUSE RATING:

125% of rated current

$$\frac{125 \times}{100} = \quad A$$

NAME PLATE DETAILS:

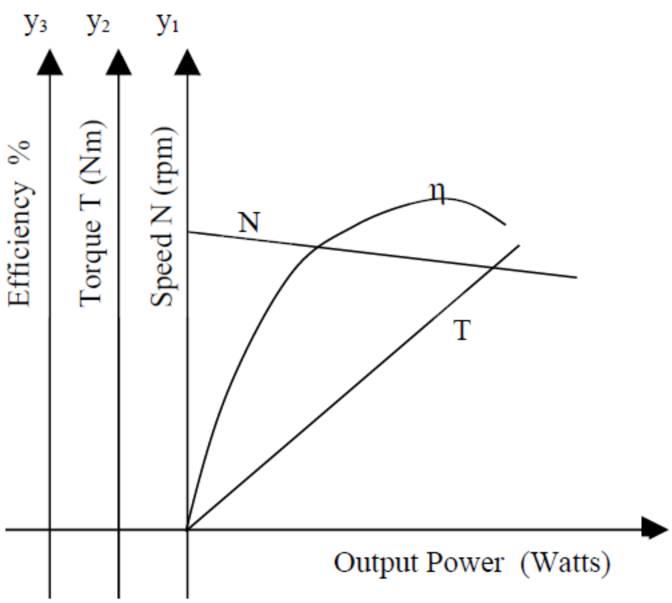
Rated Voltage :
Rated Current :
Rated Power :
Rated Speed :

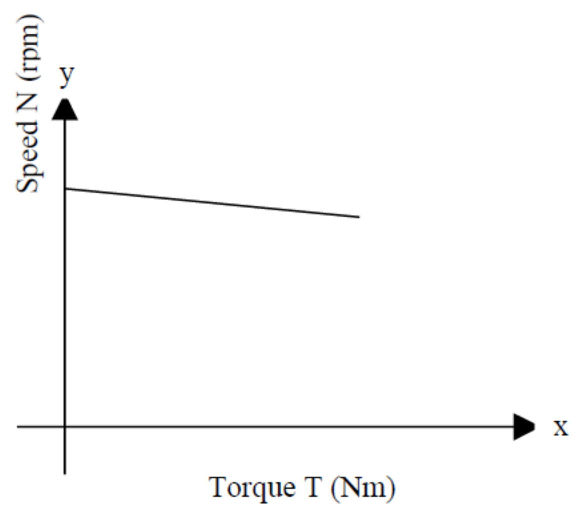
Tabular column:

SNO	Voltage In Volts	Current In Amps	LOAD		Torque T (Nm)	Speed N rpm	Input P_i watts	Output P_o watts	Efficiency η in %
			S_1	S_2					

			Kg	Kg					

Model graph:





Model calculations:

Circumference of the Brake drum = ______ cm

$$R = \frac{circumference}{2\pi}\ metre$$

$$Torque = (S1 \sim S2) \times R \times 9.81\ Nm$$

Input Power Pi = V×I Watts

$$Output\ power = \frac{2\pi NT}{60}\ Watts$$

$$Efficiency\ \eta = \frac{output\ power}{input\ power}\ \%$$

RESULT:

Thus load test on DC Compound Motor is conducted and its efficiency is determined.

Ex. No: 6

Date:

Speed Control of DC shunt motor.

AIM:

To obtain speed control of DC shunt motor by

- Varying armature voltage with field current constant.
- Varying field current with armature voltage constant

Apparatus required:

Sno	Apparatus	Range	Type	Quantity
1.	Voltmeter	(0-300)V	MC	1
2.	Ammeter	(0-10)A	MC	1
3.	Tachometer	(0-1500) rpm	Digital	1
4.	Rheostat	300 Ω / 1.5 A 50 Ω / 5 A	-	1
5.	Connecting wires	-	-	Required

PRECAUTIONS:

- Ensure that all the connections are tight.
- Field Rheostat should be kept in the minimum resistance position at the time of starting and stopping the motor.
- Armature Rheostat should be kept in the maximum resistance position at the time of starting and stopping the motor.

PROCEDURE:

1. Connections are made as per the circuit diagram.
2. After checking the maximum position of armature rheostat and minimum position of field rheostat, DPST switch is closed

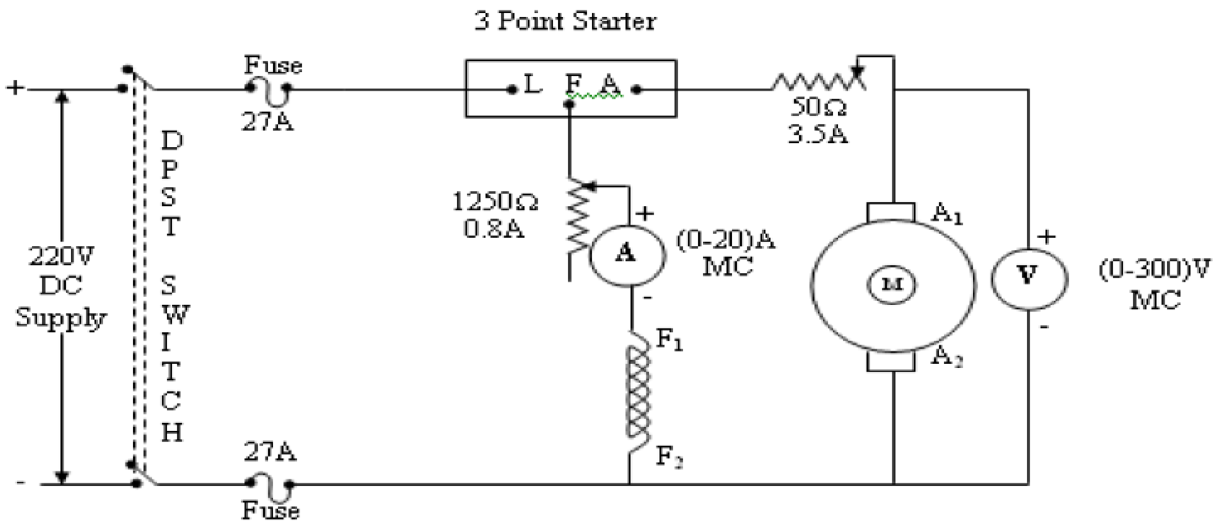
Armature Control:

1. 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.

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 rheostat to maximum position DPST switch is opened.

CIRCUIT DIAGRAM



FUSE RATING:

125% of rated current

$$\frac{125 \times}{100} = \quad A$$

NAME PLATE DETAILS:

Rated Voltage :
Rated Current :
Rated Power :
Rated Speed :

Tabular column:

Armature Control Method

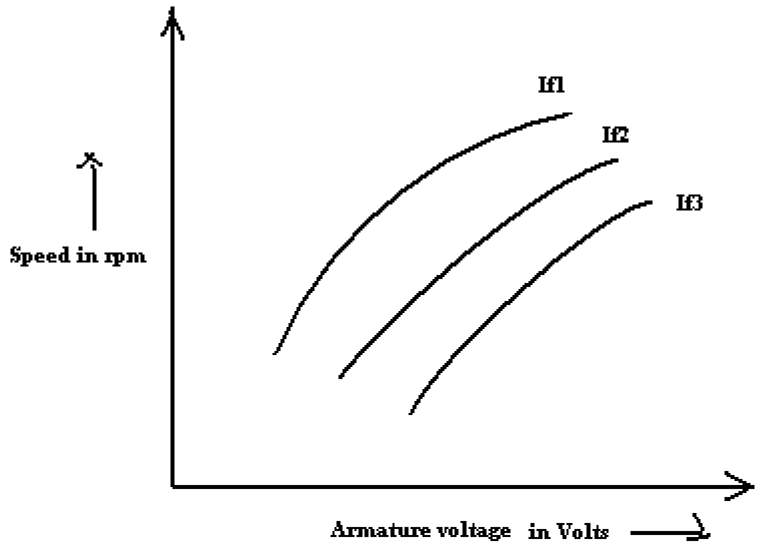
S.no	I_{f1}=		$I_{f2=}$		I_{f3}=	
	Armature Voltage (V)	Speed N in rpm	Armature Voltage (V)	Speed N in rpm	Armature Voltage (V)	Speed N in rpm

Field Control Method

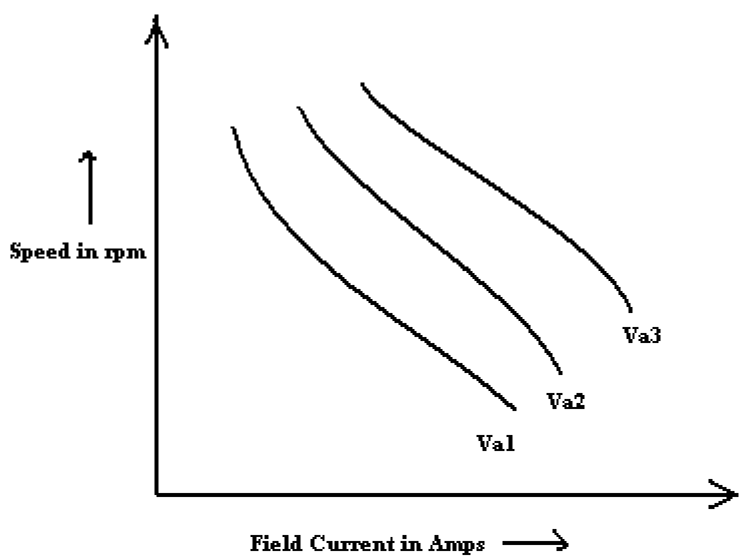
S.no	V_{a1}=		V_{a2}=		V_{a3}=	
	Field Current in Amps	**Speed N in rpm**	**Field Current in Amps**	**Speed N in rpm**	**Field Current in Amps**	**Speed N in rpm**

Model Graph:

Armature Control Method



Field Control Method:



RESULT:

Thus the speed of the DC shunt motor is controlled by Armature control method and field control method.

Ex. No: 7

Date:

SWINBURNE'S TEST

AIM:

To conduct Swinburne's test on DC machine to determine efficiency when working as generator and motor without actually loading the machine.

Apparatus required:

S.no	Apparatus	Range	Type	Quantity
1.	Voltmeter	(0-300)V	MC	1
2.	Ammeter	(0-20)A	MC	1
3.	Tachometer	(0-1500) rpm	Digital	1
4.	Rheostat	300 Ω / 1.5 A	-	1
5.	Connecting wires	-	-	Required

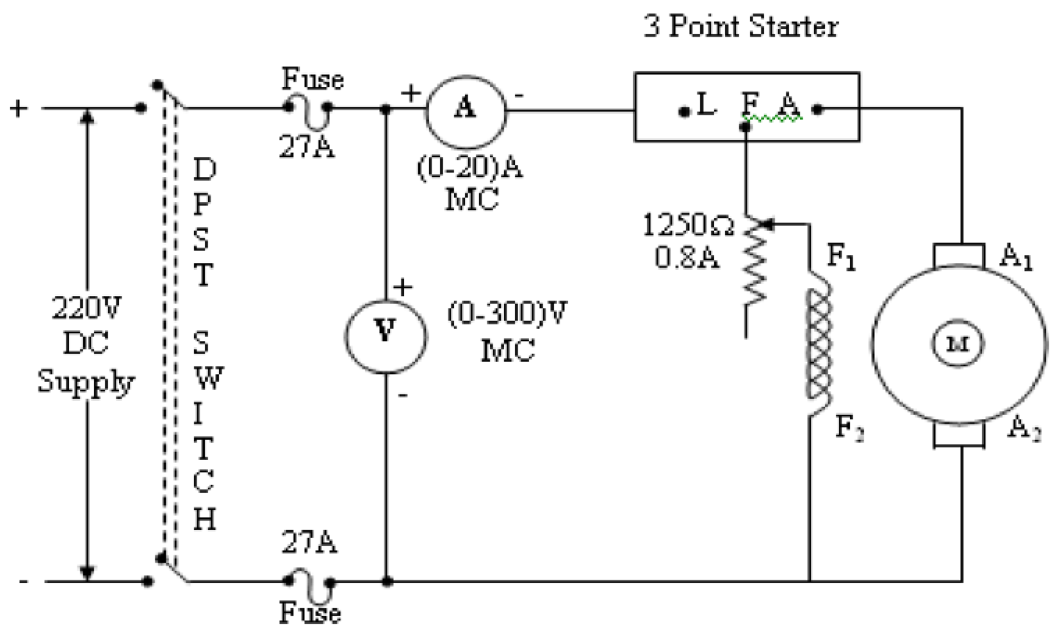
PRECAUTIONS:

- Ensure that all the connections are tight.
- The field rheostat should be in the minimum position at the time of starting and stopping the motor.

PROCEDURE:

1. Connections are made as per the circuit diagram.
2. Supply is given by closing the DPST switch.
3. Readings of Ammeter and Voltmeter are noted.
4. Armature resistance in Ohms is calculated as Ra = (Vx1.5) /I

CIRCUIT DIAGRAM



FUSE RATING:

125% of rated current

$$\frac{125 \times}{100} = \quad A$$

NAME PLATE DETAILS:

Rated Voltage :
Rated Current :
Rated Power :
Rated Speed :

Tabular column:

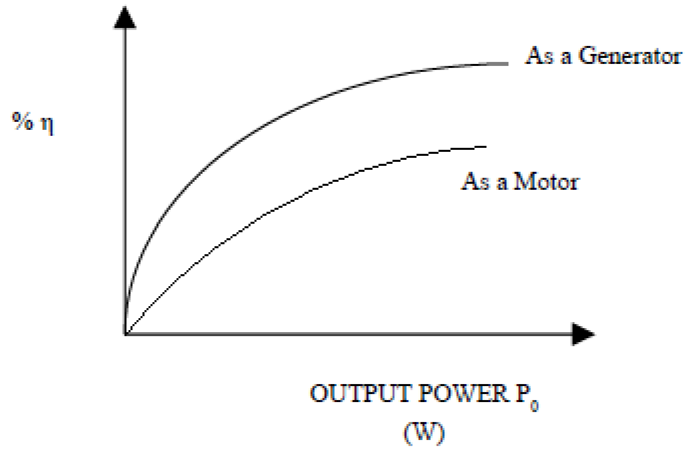
As a Motor

SNO	V_L in Volts	I_L in Amps	I_a in Amps	$I_a^2R_a$ in watts	Total losses in watts	Output Power in watts	Input Power in watts	Efficiency η %

As a Generator

SNO	V_L in Volts	I_L in Amps	I_a in Amps	$I_a^2R_a$ in watts	Total losses in watts	Output Power in watts	Input Power in watts	Efficiency η %

Model Graph:



Model Calculation:

Hot Resistance R_a = 1.2 X R Ω

Constant losses = $VI_o - I_{ao}^2 R_a$ watts

Where I_{ao} = $(I_o - I_f)$ Amps

AS MOTOR:

Load Current I_L = _____ Amps (Assume 15%, 25%, 50%, 75% of rated current)

Armature current Ia = $I_L - I_f$ Amps

Copper loss = $I_a^2 R_a$ watts

Total losses = Copper loss + Constant losses

Input Power = VI_L watts

Output Power = Input Power – Total losses

$$\text{Efficiency } \eta \,\% = \frac{\text{Output power}}{\text{Input Power}} \times 100\%$$

AS GENERATOR:

Load Current I_L = _____ Amps (Assume 15%, 25%, 50%, 75% of rated current)

Armature current Ia = $I_L + I_f$ Amps

Copper loss = $I_a^2 R_a$ watts

Total losses = Copper loss + Constant losses

Output Power = VI_L watts

Input Power = Input Power +Total losses

$$\text{Efficiency } \eta \,\% = \frac{\text{Output power}}{\text{Input Power}} \times 100\%$$

RESULT:

Thus the efficiency of DC machine is predetermined by Swinburne's test.

Ex. No: 8

Date:

Load test on single-phase transformer

AIM:

To conduct load test on single phase transformer and to find efficiency and percentage regulation

Apparatus required:

Sno	Apparatus	Range	Type	Quantity
1.	Voltmeter	(0-300)V (0-150)V	MI MI	1 1
2.	Ammeter	(0-10)A (0-5)A	MI	1 1
3.	Wattmeter	300 V, 5 A 150 V, 10 A	UPF	1
4.	1 Φ Auto Transformer	(0-300) V	-	1
5.	Loading Rheostat	-	-	1
6.	Connecting wires	-	-	Required

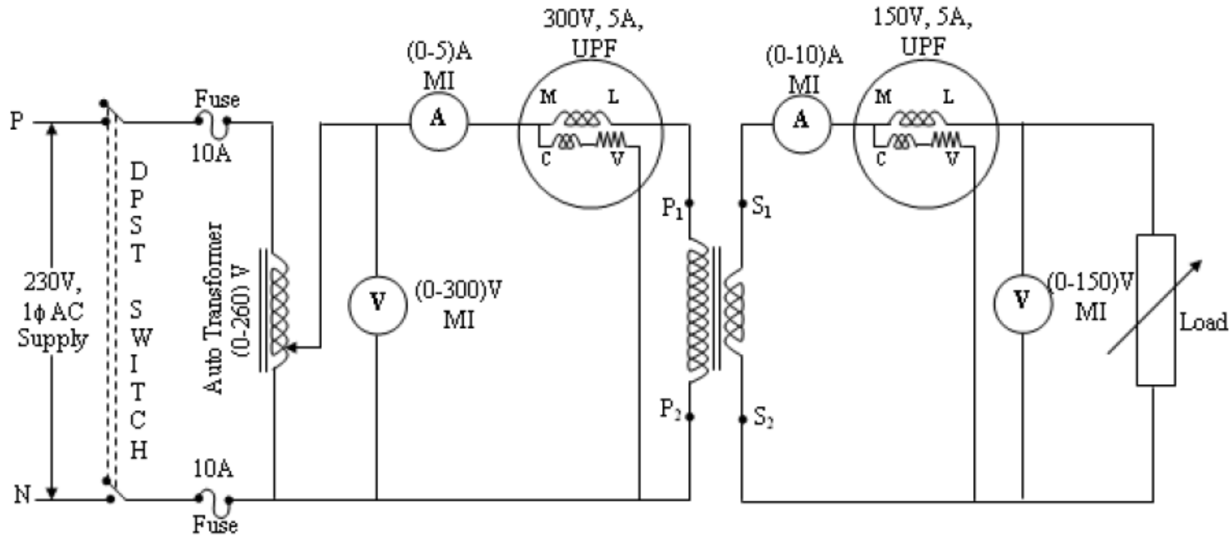
PRECAUTIONS:

- Ensure that all the connections are tight.
- Auto Transformer should be in minimum position.
- The AC supply is given and removed from the transformer under no load condition.

PROCEDURE:

1. Connections are made as per the circuit diagram
2. After checking the no load condition, minimum position of auto transformer and DPST switch is closed.
3. Ammeter, Voltmeter and Wattmeter readings on both primary side and secondary side are noted.
4. The load is increased and for each load, Voltmeter, Ammeter and Wattmeter readings on both primary and secondary sides are noted.
5. Again no load condition is obtained and DPST switch is opened.

CIRCUIT DIAGRAM:



FUSE RATING:

125% of rated current

$$\frac{125 \times}{100} = \quad A$$

NAME PLATE DETAILS:

	Primary	Secondary
Rated Voltage :		
Rated Current :		
Rated Power :		

Tabular Column

S.No.	Load	Primary			Secondary			Input Power W_1 x MF	Output Power W_2 x MF	Efficiency η %	% Regulation
		V_1 (Volts)	I_1 (Amps)	W_1 (Watts)	V_2 (Volts)	I_2 (Amps)	W_2 (Watts)				

Model Calculation:

Output Power = W2 x Multiplication factor

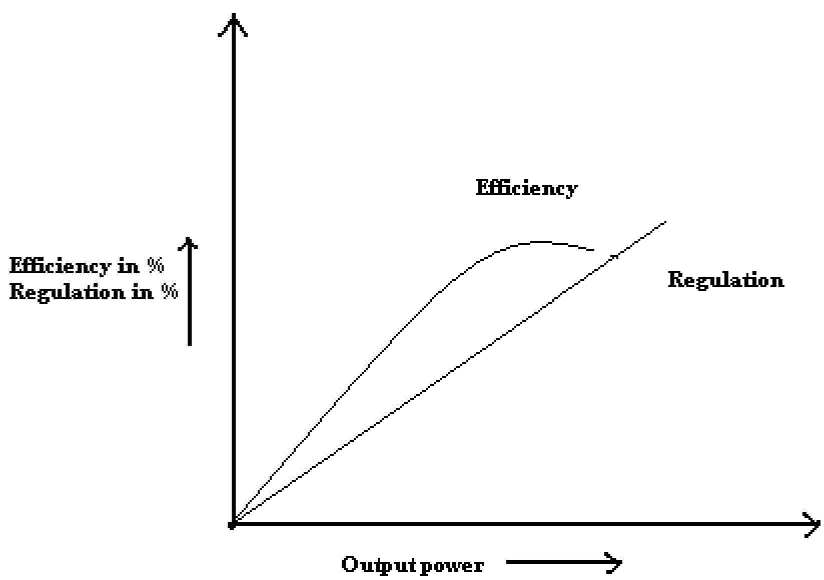
Input Power = W1 x Multiplication factor

Output Power

Efficiency $\eta = \frac{input\ power}{output\ power} \times 100$ in %

Regulation $\%R = \frac{V - Vl}{V} \times 100\ in\ \%$

Model Graph:



Result:

Thus the load characteristics of single Phase transformer was determined.

Ex. No: 9

Date:

Open circuit and short circuit tests on single phase transformer

AIM:

To predetermine the efficiency and regulation of a transformer by conducting open circuit test and short circuit test and to draw equivalent circuit.

APPARATUS REQUIRED:

Sno	Apparatus	Range	Type	Quantity
1.	Voltmeter	(0-150)V	MI	1
2.	Ammeter	(0-2)A (0-5)A	MI	1 1
3.	Wattmeter	150 V, 5 A 150 V, 5 A	UPF LPF	1
6.	Connecting wires	-	-	Required

PRECAUTIONS:

Auto Transformer should be in minimum voltage position at the time of closing & opening DPST Switch.

PROCEDURE:

OPEN CIRCUIT TEST:

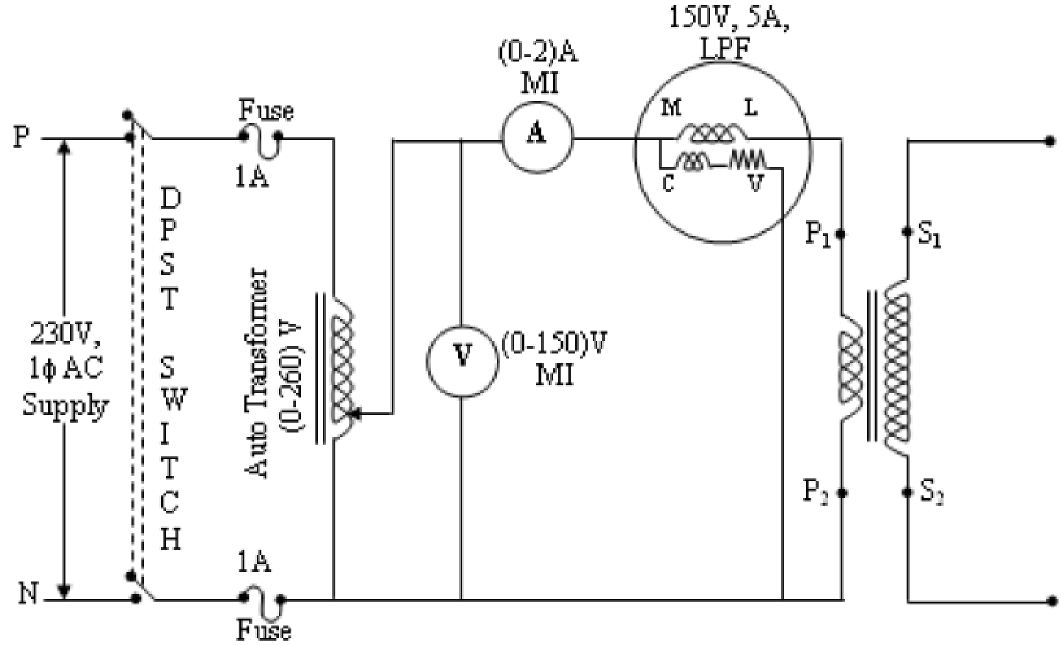
1. Connections are made as per the circuit diagram.
2. After checking the minimum position of Autotransformer, DPST switch is closed.
3. Auto transformer variac is adjusted get the rated primary voltage.
4. Voltmeter, Ammeter and Wattmeter readings on primary side are noted.
5. Auto transformer is again brought to minimum position and DPST switch is opened.

SHORT CIRCUIT TEST:

1. Connections are made as per the circuit diagram.
2. After checking the minimum position of Autotransformer, DPST switch is closed.
3. Auto transformer variac is adjusted get the rated primary current.
4. Voltmeter, Ammeter and Wattmeter readings on primary side are noted.
5. Auto transformer is again brought to minimum position and DPST switch is opened.

CIRCUIT DIAGRAM

Open circuit Test:



FUSE RATING:

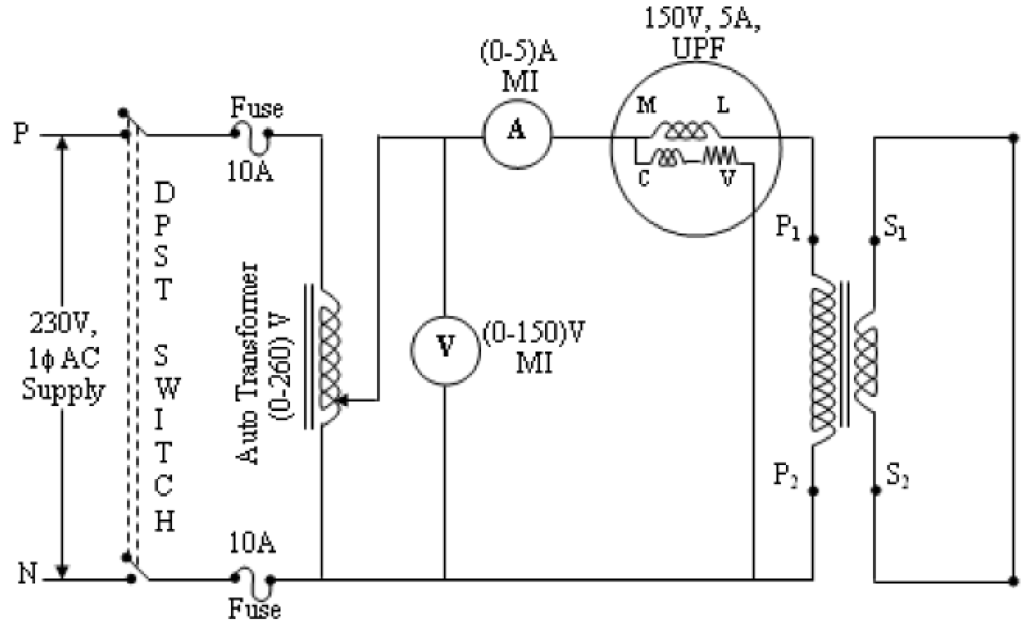
10% of rated current

$$\frac{10 \times}{100} = \quad A$$

NAME PLATE DETAILS:

	Primary	**Secondary**
Rated Voltage :		
Rated Current :		
Rated Power :		

Short circuit Test:



FUSE RATING:

125% of rated current

$$\frac{125 \times}{100} = \quad A$$

NAME PLATE DETAILS:

	Primary	Secondary
Rated Voltage :		
Rated Current :		
Rated Power :		

Tabular Column:

Open circuit test:

Sno	Voltage V_O in volts	Current I_o in amps	W_o in watts

Short circuit test:

Sno	Voltage Vsc in volts	Current Isc in amps	W_{sc} in watts

Model calculation:

Core loss: $W_o = V_o I_o \cos\Phi_o$

$$\cos\phi_o = \frac{W_o}{V_o I_o} \qquad \phi_o = \cos^{-1}\frac{W_o}{V_o I_o}$$

$$I_\omega = I_o \cos\phi_o \text{(Amps)} \qquad I_\mu = I_o \sin\phi_o \text{(Amps)}$$

$$R_o = \frac{V_0}{I_\omega}\ \Omega \qquad X_o = \frac{V_0}{I_\mu}\ \Omega \qquad R_{o2} = \frac{W_{sc}}{I_{sc}^2}\ \Omega$$

$$Z_{o2} = \frac{V_{sc}}{I_{sc}}\ \Omega \qquad X_{o2} = (Z_o^2 - R_{o2}^2)^{1/2}$$

$$R_{o1} = \frac{R_{02}}{K^2}\ \Omega \qquad X_{o1} = \frac{X_{02}}{K^2}\ \Omega \qquad K = \frac{V_2}{V_1} = 2$$

$$Efficiency, \eta = \frac{x \times KVA\,rating \times 1000 \times cos\emptyset}{(x \times KVA\,rating \times 1000 \times cos\emptyset) + Wo + x^2 Wsc}$$

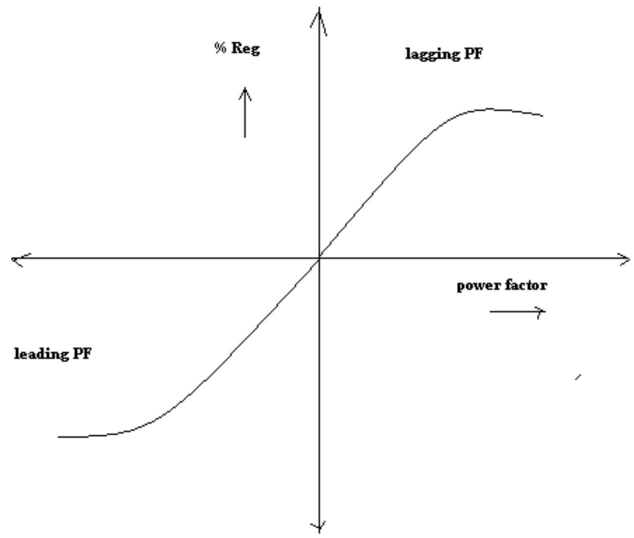
$$\%\,Regulation = \frac{x \times (IscR_{02}Cos\emptyset \pm IscX_{02}Sin\emptyset)}{V_2} \times 100$$

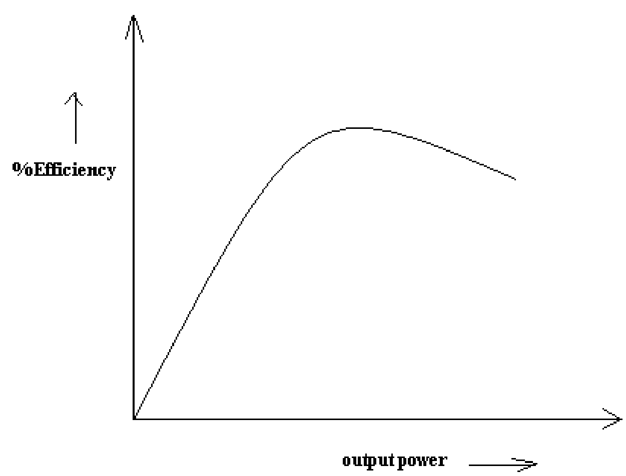
$$(+lagging, -leading)$$

Tabular Column:

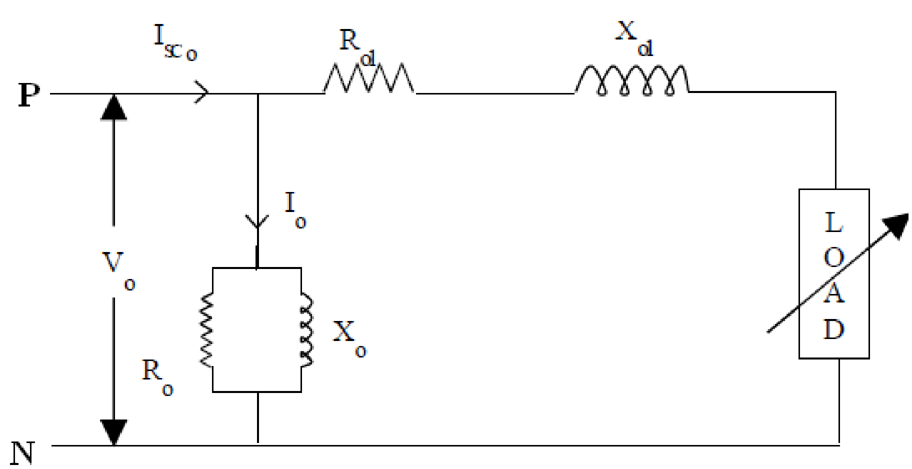
X % load	Efficiency		Regulation	
	0.8 lag	0.8 lead	0.8 lag	0.8 lead
0.25				
Half load- 0.5				
0.75				
full load – 1				

Model Graph





Equivalent Circuit



RESULT:

Thus the efficiency and regulation of a transformer is predetermined by conducting open circuit test and short circuit test and the equivalent circuit is drawn

Ex. No: 10

Date:

SEPARATION OF NO-LOAD LOSSES IN SINGLE PHASE TRANSFORMER

AIM:

To separate the eddy current loss and hysteresis loss from the iron loss of single phase transformer.

TABULAR COLUMN:

Sno	Apparatus	Range	Type	Quantity
1.	Voltmeter	(0-300)V	MI	1
2.	Ammeter	(0-2)A	MC	1

				1
3.	Wattmeter	300 V, 5 A	LPF	1
4.	Rheostat	700 Ω/1.5 A	Wire wound	1
4.	Connecting wires	-	-	Required

PRECAUTIONS:

1. The motor field rheostat should be kept at minimum resistance Position.
2. The alternator field rheostat should be kept at maximum resistance Position.

PROCEDURE:

1. Connections are given as per the circuit diagram.
2. Supply is given by closing the DPST switch.
3. The DC motor is started by using the 3 point starter and brought to rated speed by adjusting its field rheostat.
4. By varying the alternator filed rheostat gradually the rated primary voltage is applied to the transformer.
5. The frequency is varied by varying the motor field rheostat and the readings of frequency are noted and the speed is also measured by using the tachometer.
6. The above procedure is repeated for different frequencies and the readings are tabulated.

7. The motor is switched off by opening the DPST switch after bringing all the rheostats to the initial position.

TABULAR COLUMN:

SNO	**Speed in rpm**	**Frequency F in Hz**	**Voltage V (Volts)**	**Wattmeter reading Watts**	**Iron loss Wi (Watts)**	**Wi / f Joules**

FORMULAE USED:

Frequency, $f = (P*N_s) / 120$ in Hz

P = No. of Poles, Ns = Synchronous speed in rpm.

Hysteresis Loss $W_h = A * f$ in Watts ,A = Constant (obtained from graph)

Eddy Current Loss $W_e = B * f2$ in Watts B = Constant (slope of the tangent drawn to the curve)

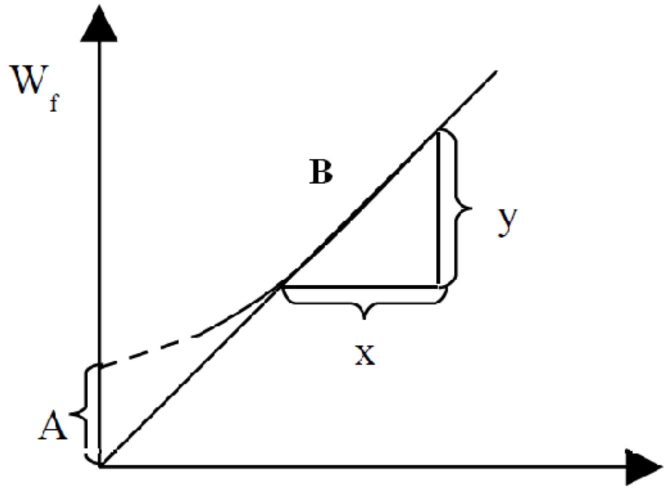
Iron Loss $W_i = W_h + W_e$ in Watts

$W_i / f = A + (B * f)$

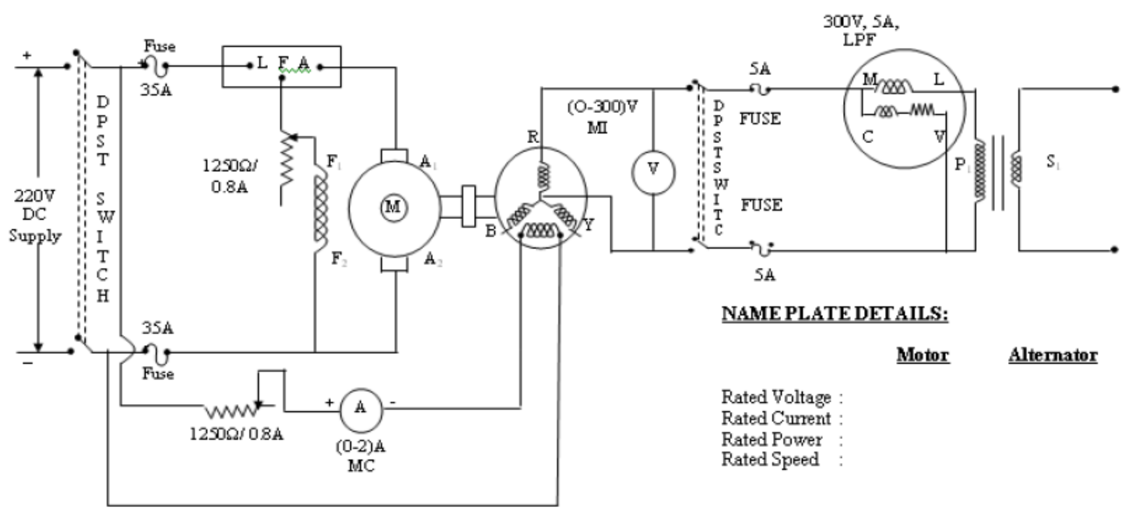
Here the Constant A is distance from the origin to the point where the line cuts the Y- axis in the graph between W_i / f and frequency f.

The Constant B is $\Delta\ (W_i / f) / \Delta f$

Model Graph:



CIRCUIT DIAGRAM:



NAME PLATE DETAILS:

	Motor	Alternator
Rated Voltage :		
Rated Current :		
Rated Power :		
Rated Speed :		

FUSE RATING:

125% of rated current

$\frac{125 \times}{100}$ = A

NAME PLATE DETAILS:

	Primary	Secondary
Rated Voltage :		
Rated Current :		
Rated Power :		

RESULT:

Thus separation of eddy current and hysteresis loss from the iron loss on a single-phase transformer is conducted.