EXPERIMENT NO: 01 Date:

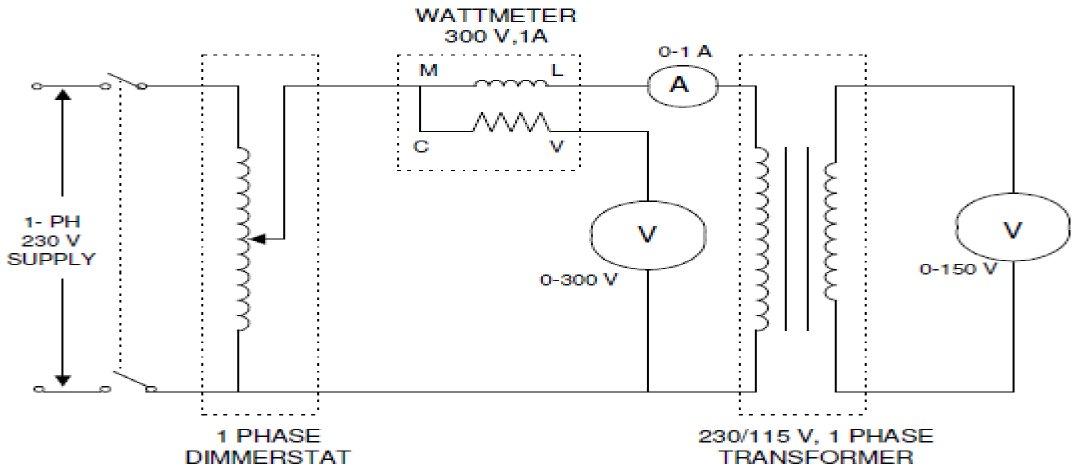
OPEN CIRCUIT & SHORT CIRCUIT TEST ON A SINGLE-PHASE TRANSFORMER.

Aim: TO PERFORM OPEN CIRCUIT & SHORT CIRCUIT TEST ON A SINGLE-PHASE TRANSFORMER

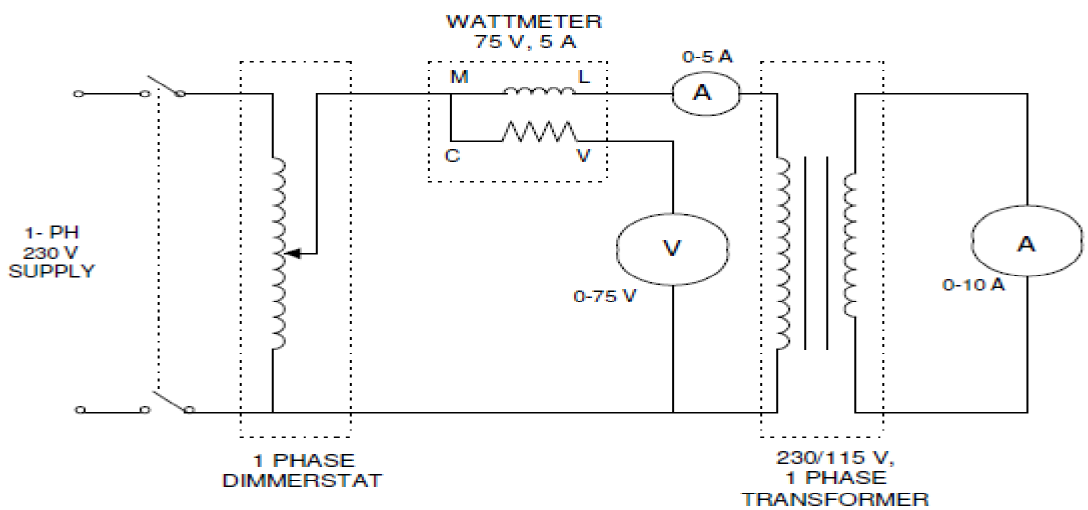
Apparatus: 1) 230/115V, 1KVA Single Phase transformer (1No.)
2) 0-250V, Single Phase dimmerstat (1No.)

FOR O.C. TEST FOR S.C. TEST
3) Voltmeter (0-300 V) (0-150 V) AC. each 1 No. 6) Voltmeter (0-75 V.) AC. 1No.
4) Ammeter (0-1 A) AC, 1 No. 7) Ammeter (0-5 A), (0-10 A) Ac. 1 each.
5) Wattmeter (300V, 1A) 1No. 8) Wattmeter (75 V, 5 A) 1No.

Circuit Diagram:
FOR O.C. TEST.



FOR S.C. TEST.



Theory: It should cover the following:

Purpose of O.C. & S.C. test.

1) Brief explanation about connection diagram.
2) Simplified equivalent circuit of a transformer and its parameters.
3) Formulae for efficiency and regulation.
4) Formulae for voltage drop for different power factor loads.

Procedure:

FOR O.C. TEST

1) Connect the circuit as shown.
2) Ensure that the dimmerstat Position is at zero.
3) Switch on the single phase AC. Supply.
4) Apply rated voltage of 230V, to the primary side of transformer.
5) Note the ammeter, voltmeter and wattmeter readings.

FOR S.C. TEST

1) Connect the circuit as shown.
2) Ensure that the dimmerstat position is at '0' (zero).
3) Switch on the single phase AC. Supply.
4) Slowly increase the output voltage of the dimmerstat till the ammeter on primary side shows rated current of 4.35 amp.
5) Note the ammeter, voltmeter & wattmeter readings.

Precautions:

1) All the connections should be perfectly tight.
2) Supply should not be switched ON until& unless the connections are checked by the teacher.
3) Do not bend while taking the readings
4) No loose wires should lie on the work table.
5) Thick wires should be used for current circuit and flexible wires for voltage circuits.
6) The multiplying factor of wattmeter should be correctly used.

Observations:

FOR O.C.TEST (Read on primary side.)

Rated input Voltage V_0	No load current I_0	No load power W_0
230V		

FOR S.C. TEST (Read on primary side)

Short circuit voltage Vsc	Rated primary current (i.e full load value) Isc	Short circuit power Wsc
	4.35amp	

Calculations:

Equivalent Circuit:

Draw simplified equivalent circuit showing calculated values of all parameters on it.

Result: -

Conclusion:

EXPERIMENT NO: 02 Date:

POLARITY TEST ON TWO WINDING TRANSFORMER

Aim: TO PERFORM POLARITY TEST ON TWO WINDING TRANSFORMER

Apparatus :

1) Two winding transformer (230 / 115 V, 1 KVA)
2) Voltmeter (0-300 V) 1 No. (0-150 V) 2Nos.
3) Ammeter (0-5 A) 3 Nos.
4) Loading rheostat (5 KW)
5) Single phase dimmerstat (1 KVA)
6) Transformer (Teaser with tapping on primary & secondary)

Circuit Diagram :

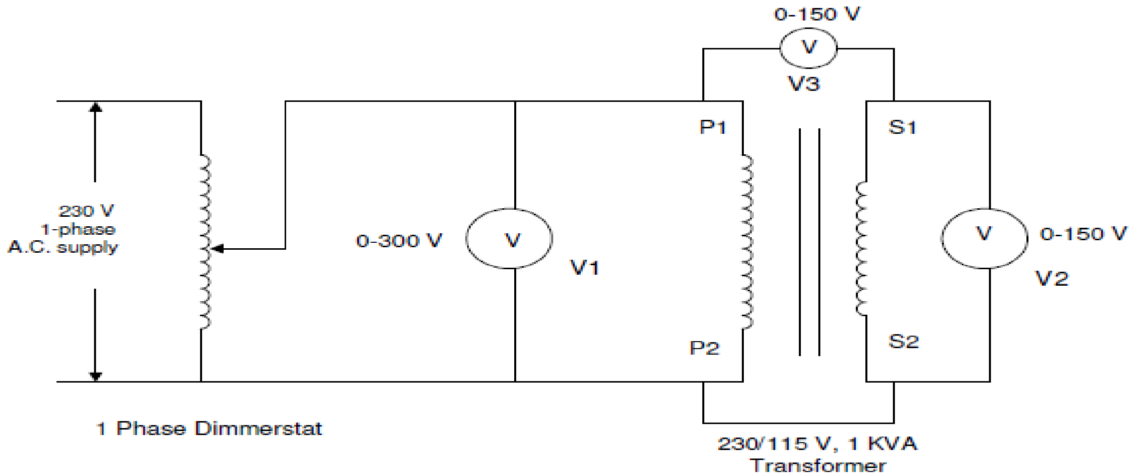


Figure (a) Polarity marking on two winding transformer.

Theory :

It should cover the following points

1) Explanation of dot and cross marking in general
2) Concept of polarity marking of two mutually coupled coils.
3) Importance of correct polarity in parallel operation of transformers
4) Auto transformer

Procedure :

(A) POLARITY MARKING

i) Make the connections as shown in figure (a)

ii) Connect the primary winding P1 – P2 to supply.

iii) Short circuit the terminals P2 & S2

iv) Connect the voltmeters across primary & secondary windings of transformer & one voltmeter across P1 and S1

v) Switch on the supply.

vi) By varying the input voltage with the help of dimmerstat take various reading V1 , V2 and V3 for various steps of input voltage.

vii) Analyse the readings and decide about polarity marking of two windings of transformer.

For this assume that a dot is present at terminal P1 of the primary winding. If V3 = (V1 + V2), the transformer has additive polarity and the other dot should be marked at S2.

If V3 = (V1 - V2), the transformer has subtractive polarity and other dot should be marked at S1.

Precautions:

1) All the connection should be perfectly tight.

2) Supply should not be switched ON unstill & unless the connection are checked by the teacher.

3) Do not bend while taking the readings.

4) No loose wire should lie on the work-table.

Conclusion:

a) The given transformer is found to have _____________ polarity . If a dot is marked at P1 on primary side, the dot on secondary side should be at_____

b) The step-up and step-down modes of auto-transformer were studied.

EXPERIMENT NO: 03 Date:

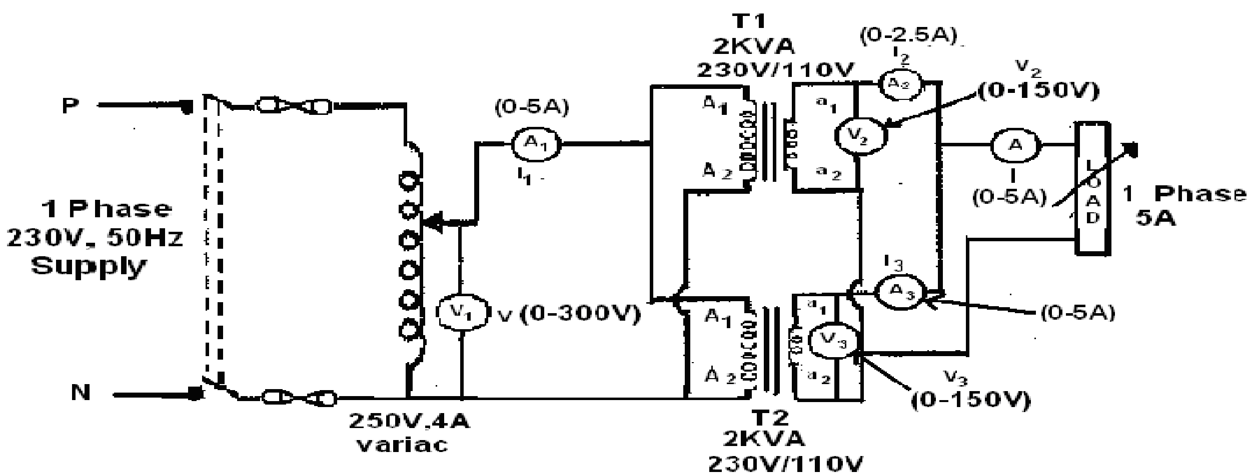
Parallel operation of two single phase transformers

Aim: TO PERFORM PARALLEL OPERATION OF TWO TRANSFORMERS

Apparatus:

1) Two transformers, (1- phase, 1 kVA, 220 /115 V,)
2) Two dimmer stats, (0-270 V, 1- phase, 5 A)
3) Voltmeter, (0-300 V),(0-75 V)
4) Ammeter, (0-2 A),(0-10 A)
5) Wattmeter (0-300 V, 2 A),(0-75 V, 10 A)
6) Connecting wires.

Circuit Diagram:



Apparatus:

Sr. No.	Name of Apparatus	Specification	Qty
1	Varaic	250V,4A	1
2	Voltmeter	(0-300V)	1
		(0-150V)	2
3	Ammeter	(0-5A),	3
		(0-2.5A)	1
4	Single phase transformer	2KVA,230/110V	2
5	Lamp Load	1Ph., 5A	1

Theory:

1) Make the connections as shown in circuit diagram.
2) Keep switches S2 & S3 open and the dimmerstats at zero position.
3) Switch ON the supply and check the correctness of polarities of the two transformers. If $V_2 = 0$ then polarities of connected transformers are correct i.e. connections are back to back and emf induced in secondaries are in phase opposition but if $V_2 = 2xKxV_1$, then secondary emfs are in phase,in that case change the polarities of any one secondary winding.
4) Note down the readings of V_1, I_1 and W_1
5) Now close switch S2, S3 and increase dimmerstat output voltage gradually so that full load current flows through secondary windings.
6) Note down V_2 , I_2 and W_2. While doing so , the values shown by V_1, I_1 and W_1 should not deviate from their earlier readings.

Observation Table:

Sr. No.	Primary side		Transformer No. 1 (T1)		Transformer No. 2 (T2)	
	I_1 (Amp)	V_1 (Volt)	I_2 (Amp)	V_2 (Volt)	I_3 (Amp)	V_3 (Volt)
1						
2						
3						

Calculations:

Iron loss per transformer $W_i = W_1 / 2$

Copper loss per transformer $W_{cu} = W_2 / 2$

$$\% \text{ Efficiency} = \frac{\text{Out put Power}}{\text{Output Power + Losses}} \times 100$$

$$\% \eta = \frac{\text{kVA x Cos } \phi}{\text{kVA x Cos } \phi + \text{Iron loss + Cu. Loss}} \times 100$$

With the help of above equation, calculate efficiency at

1. Full load , UPF
2. Half full load and 0.8 p.f. lagging.

Results: It is found that,

i) % Efficiency at F.L. & unity power factor =

ii) % Efficiency at half full load & 0.8 power factor (lag.) =

Conclusion:

EXPERIMENT NO: 04 Date:

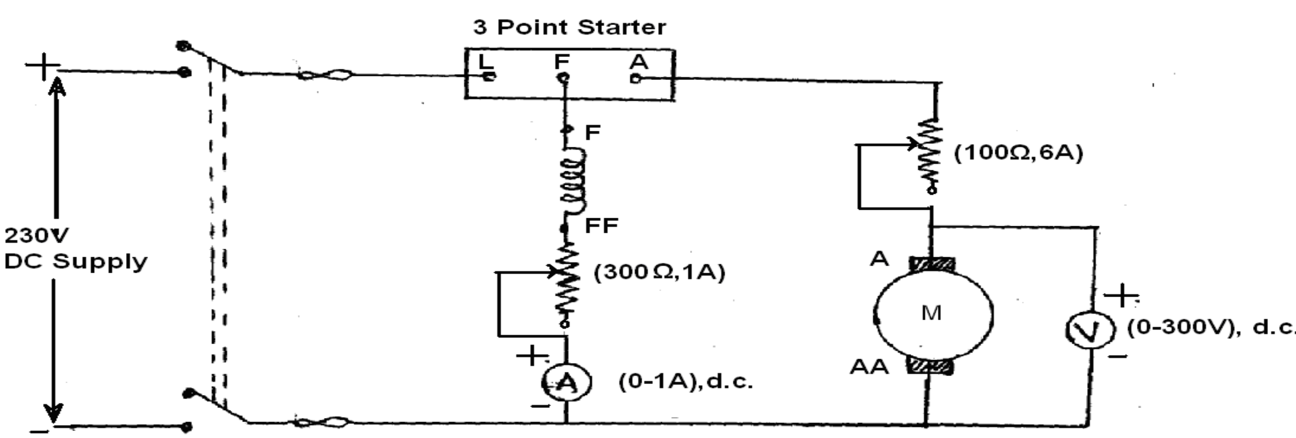
Speed control of D.C. Shunt motor

Aim: Speed control of a D.C. shunt motor by
1. Armature voltage control method
2. Flux control method

Apparatus:

Sr. No.	Name of Apparatus	Specification	Qty
1	D.C.Shunt motor	1 Hp,220 V,4 A,1500 rpm	1
2	D.C.Ammter	0-1 A	1
3	D.C.voltmeter	0- 300 V	1
4	Variable Rheostat	300 ohm,1A & 1OO ohm ,6A	2
5	Digital Tachometer		1
6	Three point Starter		1

Circuit Diagram:



Theory: The theory should cover details about following points.
1) Principle of working of dc shunt motor
2) Relation between speed, armature resistance and flux.
3) Explanation of above circuit diagram.
4) Brief explanation about speed control by above two methods.

Procedure:
1) Connect the circuit as shown above.
2) Adjust both rheostats at their minimum resistance position initially.
3) Switch ON the DC supply.
4) Turn the moving arm of starter to it's minimum resistance position.

(A) FOR ARMATURE VOLTAGE CONTROL

5) Take a set of readings at minimum resistance position of both rheostats. Keeping field current constant, vary the rheostat connected in armature circuit by increasing it's value and note down the armature voltage and corresponding values of speed.

(B) FOR FIELD CURRENT CONTROL

6) Bring the rheostat connected in armature circuit back to minimum resistance position.

7) Keeping armature voltage constant now increase the resistance of field circuit by adjusting its rheostat.

8) Measure field current and corresponding values of speed.

9) After taking the required sets of readings adjust both rheostats to their minimum resistance position and switch OFF the dc supply.

Precautions:

1) All connections should be perfectly tight and no loose wire should lie on the work table.
2) Before switching ON the dc supply , ensure that the starter's moving arm Is at it's maximum resistance position.
3) Do not switch on the supply, until and unless the connection are checked by the teacher
4) Avoid error due to parallax while reading the meters.
5) Hold the tachometer with both hands steady and in line with the motor shaft so that it reads correctly.

Observations:

(A) FOR ARMATURE VOLTAGE CONTROL

Field current (If) = Amps (constant)

Sr. No.	If (Amp)	Va (Volts)	Speed (N) rpm.
1			
2			
3			
4			
5			

(B) FOR FIELD CURRENT CONTROL

Armature voltage (Va) = ______volts (constant)

Sr. No.	If (amp)	Va (Volts)	Speed (N) rpm.
1			
2			
3			
4			
5			

Graph: Plot the following on separate graph papers.

1) N versus V_a 2) N versus I_f

Conclusion:

It is observed that the speed of dc shunt motor increases above normal value by field current control method and decreases below normal value by armature control method.

EXPERIMENT NO: 05 Date:

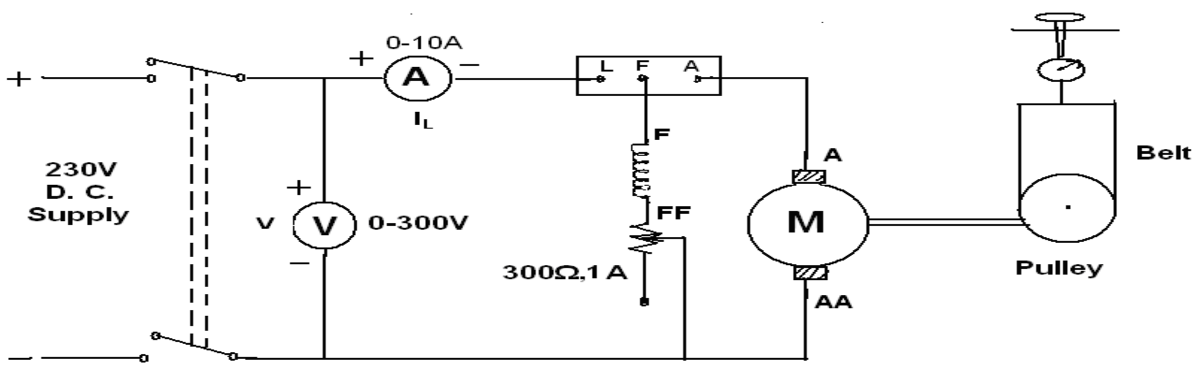
LOAD TEST ON D.C. SHUNT MOTOR.

Aim: To Perform Break Test On D.C. Shunt Motor.

Apparatus:

Sr. No.	Name of Apparatus	Specification	Qty
1	D.C. shunt motor	2Hp, 230V, 1500r.p.m	1
2	D.C. Ammeter	0-10A	1
3	D.C. Voltmeter	0-300V	1
4	Digital Tachometer	-	1
5	Rheostat	300Ω ,1A	1

Circuit Diagram:



Theory:

It should cover the following

1) Principle of D.C.shunt motor
2) What is back e.m.f?
3) What is the effect on speed when motor is loaded?
4) How the speed of shunt motor is expressed in terms of back emf & flux (f) & also in terms of voltage & armature current

Procedure:

1) Connect the circuit as shown in figure and keep the load zero.
2) Set the field rheostat of motor to zero & field rheostat of generator to maximum.
3) Switch on D.C. supply & start the motor with the help of starter
4) Adjust the field rheostat of motor to obtain rated speed or any suitable speed. Then don't disturbed this setting.
5) Adjust the D.C.shunt generator voltage to its rated value(220 V) with the help of its field rheostat.
6) Note the meter readings and speed at this no-load condition.

7) Now increase the electrical load and adjust the generator terminal voltage constant at previous value.
8) Note the reading of ammeters, voltmeters & speed.
9) Repeat 6 to 8 above to cover the range of no load to full load of motor.
10) Measure the armature resistance Ra of the motor by multimeter.

Precautions:

1) All connections should be perfectly tight and no loose wire should lie on the work table.
2) Before switching ON the dc supply , ensure that the starter's moving arm is at it's maximum resistance position.
3) Do not switch on the supply, until and unless the connection are checked by the teacher
4) Avoid error due to parallax while reading the meters.
5) Hold the tachometer with both hands steady and in line with the motor shaft so that it reads correctly.

Observation Table:

Sr. No.	Observations				Calculations			
	Voltage V	Current I	Weight W in Kg	Speed (r.p.m.) N	Torque N-m	Input Power Watts	Output Power watts	Efficiency
1								
2								
3								
4								

Calculations:

Graph: Plot on same graph paper

(i) Motor o/p power versus efficiency.
(ii) Motor o/p power versus Motor I/p current.
(iii) Motor o/p power versus speed.

Conclusion:

With rise in load the motor current increases & the speed decreases slightly. The efficiency initially increases with the load, reaches to its maximum & then decreases. The curves obtained experimentally are shown on the graph

EXPERIMENT NO: 06 Date:

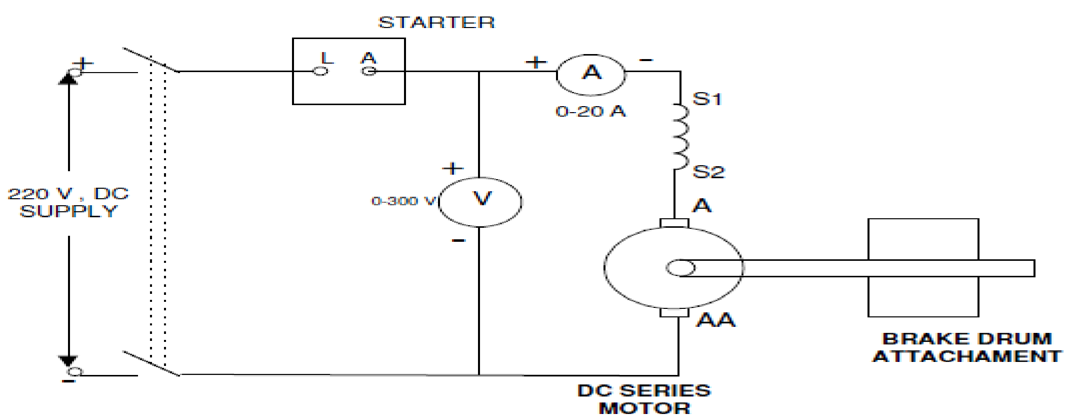
Load characteristics of D.C. series motor

Aim: To Perform Load characteristics of D.C. series motor.

Apparatus:

Sr. No.	Name of Apparatus	Specification	Qty
1	D.C. shunt motor	2Hp, 230V, 1500r.p.m	1
2	D.C. Ammeter	0-10A	1
3	D.C. Voltmeter	0-300V	1
4	Digital Tachometer	-	1
5	Rheostat	300Ω ,1A	1

Circuit Diagram*:*



Theory: It should cover the following

1. Working principle of D.C. series motor
2. Applications of D.C. series motor
3. Purpose of this test
4. Normal variation of efficiency, torque and speed of D.C. series motor with rise in load.

Procedure:

1) Connect the circuit as shown in figure.
2) Keeping some load on the motor, start itwith the help of starter.
3) At this load, note down the speed and also the forces in springs connected to brake drum.
4) Note voltmeter as well as ammeter reading.
5) Increase the mechanical load in steps by tightening the rope and note all the readings again.
6) Repeat step 5 till the rated current of motor is reached.
7) Calculate torque and efficiency of motor.

Precautions:

1) All connections should be perfectly tight and no loose wire should lie on the work table.

2) Before switching ON the dc supply , ensure that the starter's moving arm is at it's maximum Resistance position.

3) Do not switch on or operate the D.C. series motor without load

4) Before switching on the D.C.supply, ensure some water inside the drum for cooling purpose.

5) Do not switch on the supply, until and unless the connection are checked by the teacher

Observation Table: Radius of brake drum r = ______ m.

Sr. No.	Vm (Volts)	Im (Amps)	F_1 (kg)	F_2 (Kkg)	N (rpm)

Calculations:

Graph: Plot speed Vs torque and output power Vs efficiency.

Conclusion: At light load the motor speed is high and it reduces fast with rise in load.

EXPERIMENT NO: 07 Date:

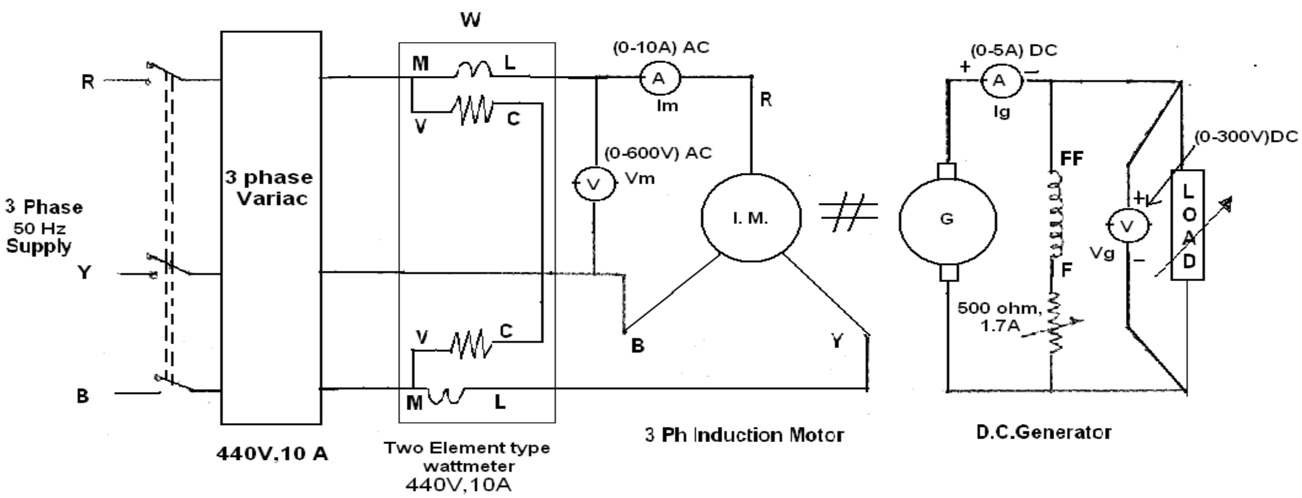
Load test on 3-phase induction motor

Aim: To perform load test on three phase induction motor.

Apparatus:

Sr No.	Name of Apparatus	Specification	Qty
1	Three phase induction motor	2HP, 1440 rpm, 415V, 3.8A	1
2	Wattmeter	440V, 10A	2
3	A.C. Ammeter	0-10A	1
4	A.C.Voltmeter	0-600V	1
5	Tachometer		
6	Three Phase Variac	440V, 10A	
7	Resistive Load Bank		

Circuit Diagram:



Theory:

It should cover the following

1) Types of induction motor.
2) Applications of 1- ϕ & 3-ϕ induction motors
3) Significance of load test on induction moto
4) Variation of parameters such as speed, p.f., η with load.
5) Write down how the induction motor is loaded in this experiment.

Observation Table:

Sr. No	Motor Side			Speed	Generator Side		Motor I/P W (watt)	Generator O/P= Vg×Ig	Gen. total losses= (Const losses+ Ia^2 Ra)	Generator I/P=(O/P+ Losses)	Motor Efficiency (η)= O/P/ I/P
	Vm (volts)	Im (amp)	Power W(watt)		Vg (volts)	Ig (amp)					

Calculations:

Graph: Draw graphs (on same graph paper) of motor output power versus

i) motor efficiency
ii) motor input current
iii) motor power factor
iv) motor speed

Result:

The speed falls, the power factor (Lagging) improves and the current increases, with an increase in the output. The efficiency increases and is maximum near full load.

Conclusion:

EXPERIMENT NO: 08 Date:

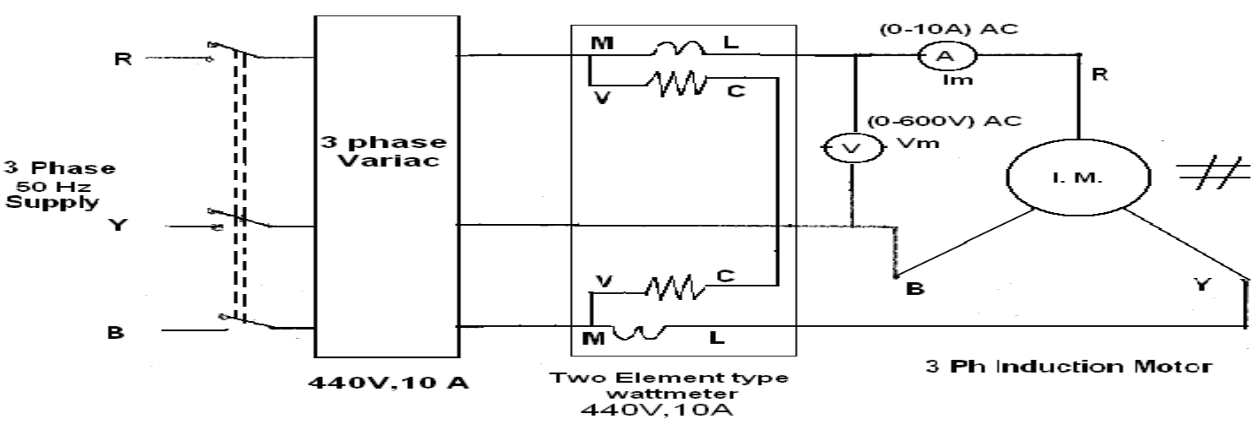
BLOCKED ROTOR AND NO LOAD TEST ON 3-PHASE INDUCTION MOTOR

Aim: Determination of Equivalent Circuit Parameters of A Three Phase Induction Motor by Performing Blocked Rotor and No Load Test.

Apparatus:

Sr No.	Name of Apparatus	Specification	Qty
1	Three phase induction motor	2HP, 1440 rpm, 415V, 3.8A	1
2	Wattmeter	440V, 10A	2
3	A.C. Ammeter	0-10A	1
4	A.C.Voltmeter	0-600V	1
5	Tachometer		
6	Three Phase Variac	440V, 10A	
7	Resistive Load Bank		

Circuit Diagram:



Theory: It should cover the following.

1. Purpose of performing these tests.
2. Complete equivalent circuit of 3-phase induction motor and its explanation
3. How the equivalent circuit parameters and machine losses can be obtained from these tests.

Procedure:

(A) FOR BLOCKED ROTOR TEST

1. Connections are made as per diagram.

2. Keep the dimmerstat position at zero output voltage and hold the rotor shaft so as to disallow its rotation.
3. Switch on the A.C. supply and gradually increase the motor input voltage till the ammeter indicates rated current of the motor.
4. Note all the meter readings

(B) FOR NO LOAD TEST

1. Connections are made as per the circuit diagram.
2. Keep the dimmerstat position at zero output voltage and the motor at no-load.
3. Switch on the A.C. supply and gradually increase the motor input voltage to a value slightly greater than its rated value.
4. Note all the meter readings and also the speed.
5. Now reduce the motor input voltage to its rated value and take all the readings.
6. Reduce motor input voltage subsequently in 9 to 10 steps and note the corresponding readings.
7. After finishing both tests, measure the stator winding resistance per phase (R) by using a multimeter or by ammeter-voltmeter method. This will give the D.C. resistance of stator winding.

Precautions:

1) All connections should be tight.
2) No loose wires should be on the working table.
3) Supply should not be switched on till connections are checked by the teacher.
4) The motor input current should not exceed its rated value.

Observation Table:

(A) FOR BLOCKED ROTOR TEST

Sr.No	Vo	Io	Wo	Speed
1				

(B) FOR NO LOAD TEST

Sr.No	Vsc	Isc	Wsc
1			

Calculations:

AC resistance of stator winding due to skin effect approximately is

R1= 1.5 x D.C. value of resistance.

(A) FOR BLOCKED ROTOR TEST

Per phase voltage $Vsc = V_{sc(L-L)}/ \sqrt{3}$

Per phase power $Psc = P_{sc(3\ ph)}/3$

Per phase equivalent impedance of motor $Z_{sc/ph} = Vsc / I_{sc} = (R_1 + R_2') + j (X_1 + X_2')$

Per phase equivalent resistance of motor $R_{sc/ph} = Psc / I_{sc}^2$

$R_2' = R_{sc/ph} - R_1$

Per phase equivalent reactance of motor $X_{sc/ph} = \sqrt{(Z_{sc/ph}^2 - R_{sc/ph}^2)}$

$X_1 = X_2' = X_{sc/ph} / 2$

(B) FOR NO LOAD TEST

Per phase voltage $Vo = V_{o(L-L)}/ \sqrt{3}$

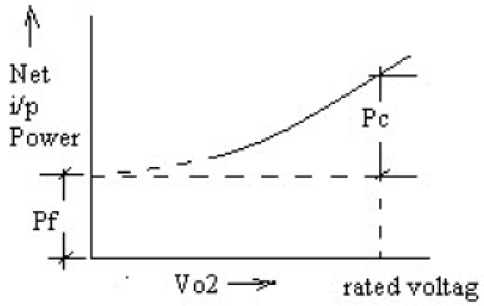
Per phase power $Po = P_{o(3\ ph)}/3$

The no-load power drawn from the supply comprises of no-load Cu loss, iron loss (Pc) and friction/ windage loss (Pf)

$Po = Io^2R_1 + Pc + Pf$

The net power input to the stator is $(Po - Io^2R_1) = (Pc + Pf)$

Plot net power input versus square of input voltage Vo^2, the intercept of the curve with power axis will give Pf and Pc.



Shunt resistance $Ro = Vo^2(\text{rated}) / Pc$

No-load power-factor $\text{Cos } \Phi o = Pc / (V_{o(\text{rated})}.Io_{(\text{ at rated } Vo)})$

Shunt reactance $Xo = V_{o(\text{rated})} / Io_{(\text{ at rated } Vo)}.\text{Sin } \Phi o$

Equivalent Circuit:

Draw equivalent circuits of 3-phase I. M. at no-load and blocked rotor conditions.

Result:

Draw complete equivalent circuit of 3-phase I. M. indicating the calculated values of all parameters on it.

Conclusion:

EXPERIMENT NO: 09 Date:

Calculation of motor performance from Experiment 7 & Experiment 8

Aim: To plot circle diagram from Calculation of motor performance from Experiment 7 and 8.

Apparatus:

Theory:

A) Blocked Rotor Tests

At standstill (s = 1), the motor impedance is [(r_1+r'_2) +j(x_1+x'_2)]. This is similar to the short circuit test on the transformer. Hence, the standstill conditions (obtained by holding or blocking the rotor and thus not allowing it to rotate, with reduced voltage applied) are like the short circuit on transformer. Hence, the blocked rotor test also is termed as a Short circuit test. Let the voltage applied be V, the short circuit current 'I_{sc}' and the power, P_{sc}, per phase.

$$\frac{V}{I_{sc}} = Z_{sc} = (r_1 + r'_2) + j\ (x_1 + x'_2)$$

$$= r + jx$$

$$P_{sc} = I_{sc}^2\ (r_1 + r'_2) = I_{sc}^2 \cdot r$$

$$(x_1 + x'_2) = \sqrt{Z_{sc}^2 - r^2}$$

$$= \sqrt{Z_{sc}^2 - (r_1 + r'_2)^2}$$

$$= \sqrt{\left(\frac{V}{I_{sc}}\right)^2 - \left(\frac{P_{sc}}{I_{sc}^2}\right)^2}$$

Further r_1 can be directly measured, and hence

$$r_2' = r - r_1$$

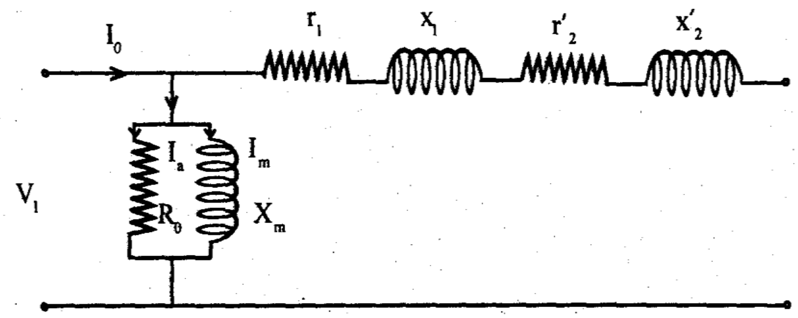
and it is a usual approximation to assume equal leakage reactance, namely, (x_1+x'_2)

$$x_1 = x'_2$$

$$x_1 = x'_2 = \frac{(x_1 + x'_2)}{2}$$

B) No load test

In the no load test, the machine is run at no load, the slip is then quite small and hence the total rotor resistance $\frac{r'_2}{s}$ becomes quite large. Due to this, we can ignore the rotor current I'_2 and say that the rotor (i.e. the secondary side of the machine) is open circuited. The motor is operated at the rated voltage and the stator current, voltage and power input are noted. Let the per phase values of these quantities be I_o, V_o and P_o respectively. Out of P_o, let the core losses be P_i,



Equivalent circuit of Induction Motor under no load In this, it is true that the current I_o flows through the stator impedance (r_1+jx_1), but since the no load current is quite small, the equivalent circuit in Fig. is acceptable. Thus from this equivalent circuit

$$V_1 I_o \cos\phi_o = P_i$$

or $$\cos\phi_o = \frac{P_i}{V_1 I_0}$$

Where $\cos\phi_o$ is the no load power factr of the motor.

Then, $$\left(\frac{V_1^2}{R_0}\right) = P_i$$

and the active component of current

$$= I_o \cos\phi_o = \frac{V_1}{R_0}$$

$$\therefore \quad R_o = \frac{V_1^2}{P_i} \quad \text{from equ. 8.14}$$

and $$\cos\phi_o = \frac{V_1}{I_0 R_0}$$

and $$\sin\phi_o = \sqrt{1-\cos^2\phi_0}$$

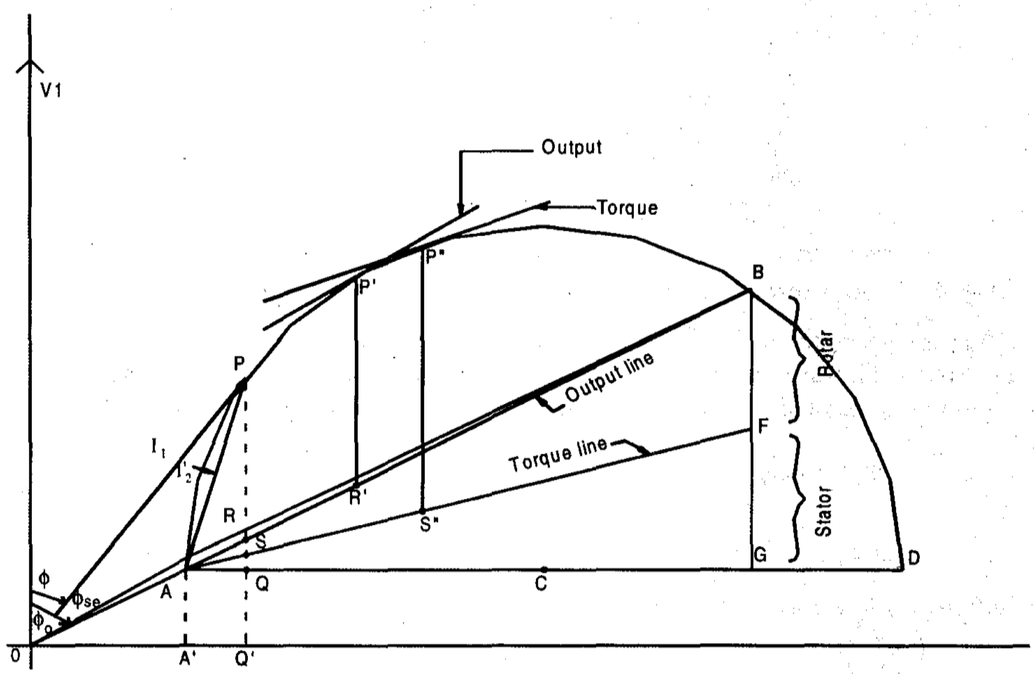
$$I_o \sin\phi_o = \frac{V_1}{X_m}$$

$$X_m = \frac{V_1}{I_0\sqrt{1-\cos^2\phi_0}}$$

Thus, with the three observations during the no load test, the two parameters R_0 and X_m are calculated.

Circle diagram from the test data

The circle diagram of an induction motor enables us to calculate its performance under different load conditions.



Procedure:

A) Blocked Rotor Test

1. Connect as shown in the Fig.
2. Set the variac to zero output and switch on the mains.
3. Apply a low voltage watching the current. Hold the rotor shaft so as to disallow rotation.
4. At a suitable current, read the ammeter, voltmeter and the wattmeter. Take readings with different currents.
5. Calculate the parameters (r_1+r'_2) and (x_1+x'_2) for the motor.
6. Measure the resistance of the stator winding (r_1), and calculate r'.

B) No Load Test.

Connect as shown in Fig.

1. Short circuit (i.e. close) the keys K_1 and K_2 Set the variac to zero and switch on the mains.
2. Apply the voltage gradually and start the motor, run at its rated speed and open the keys K_1 and K_2.
3. Apply a voltage little higher than the rated value. (For slip-ring motors, cut off external resistances).
4. Note readings in the wattmeter, voltmeter and the ammeter. Check and note the speed
5. Reduce the voltage and take the next set of readings. Also check and note the speed.

6. Take further readings as above with further reduction in the voltage. With the lower voltages, the speed may fall, and the current and hence the power input may increase.
7. At still lower voltages, the speed may drop considerably or it may even fall to zero. As soon as you observe the speed falling rapidly (to zero) which is also indicated by first increase in the ammeter and wattmeter readings, switch off the mains (or reduce the variac output to zero and then switch off the mains).
8. Calculate and plot the net power input versus the voltage applied.

Observation Table:

a) Blocked rotor test:

Sr. NO.	Line Voltage V	Line current I	Wattmeter W
1			
2			
3			

b) No load test:

Sr. NO.	Line Voltage V	Line current I	Wattmeter W
1			
2			
3			

Calculations;

From No load test:

$$\cos\Phi_0 = \frac{W}{\sqrt{3}VI} \text{ (Power factor on no load)}$$

From blocked rotor test:

$$\cos\Phi_s = \frac{W}{\sqrt{3}VI} \text{(Power factor on short circuit test)}$$

Result & conclusion:

EXPERIMENT NO: 10 Date:

INDUSTRIAL VISIT REPORT

Aim: To Make Industrial Visit Report.

EXPERIMENT NO: 11 Date:

STUDY OF STARTER

Aim: To Study different types of Starter.