Lab - 4 Report

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Experiment- 4A

Determination of Regulation of an Alternator by Synchronous Impedance Method

Aim: To determine the voltage regulation of a three phase alternator by synchronous impedance method.

Machine Specification:

Rated Current = 0.4 A
Rated Voltage = 415V ± 10%

Open Circuit Test:

Circuit was built as per the diagram, DC power was switched on and the motor was started with a 3-point starter, while keeping the rheostat at a minimum value.
Motor speed is adjusted to the sync. speed of 1500 rpm. Alternator field current is varied by varying field voltage and values, noted down.

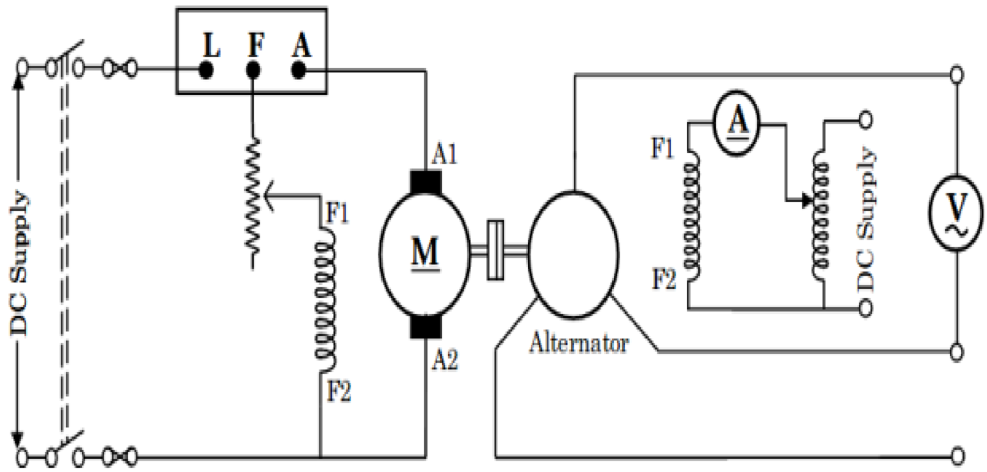


Fig1 : Circuit diagram to perform Open circuit Characteristics

Short Circuit Test:

Circuit was made as in the manual, armature current and field current values were measured. DC power is turned off and connections are removed.

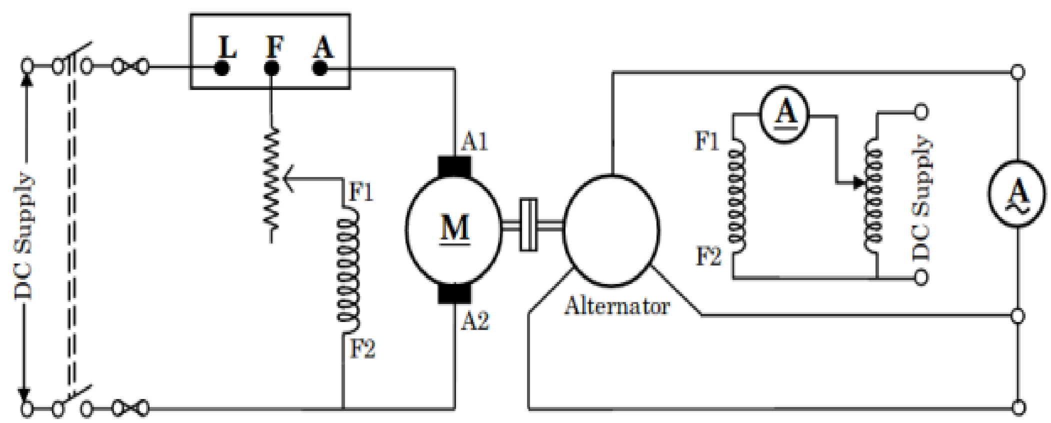


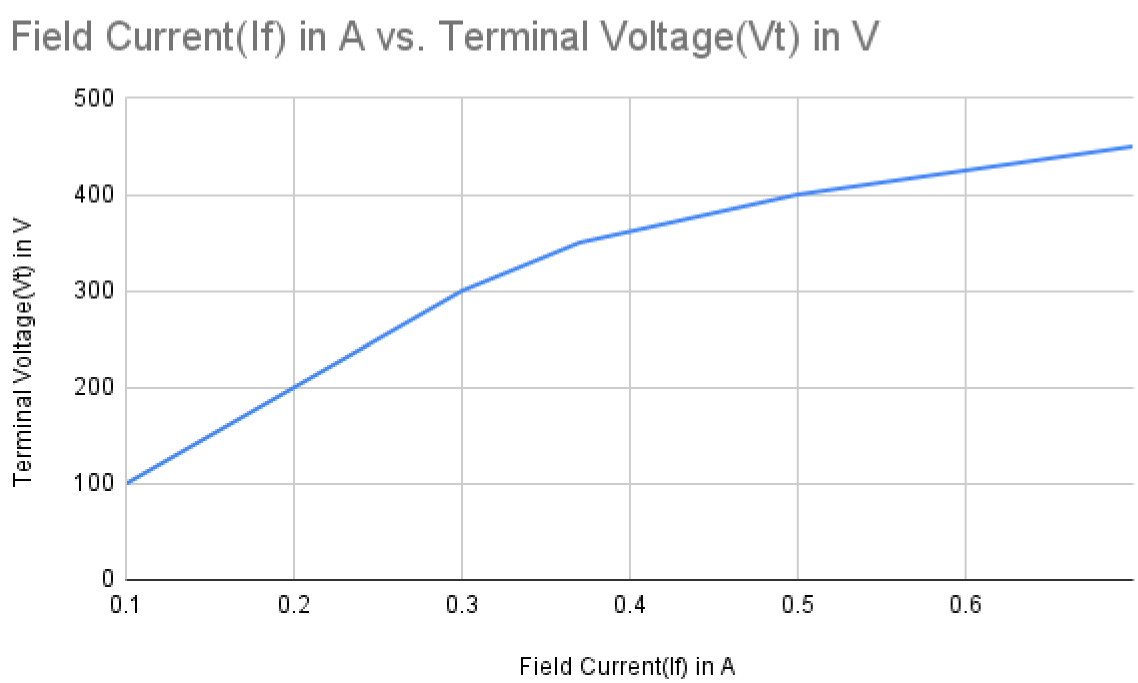
Fig 2 : Circuit diagram to perform Short Circuit Characteristics

<u>Observation:</u>

Open Circuit Test:

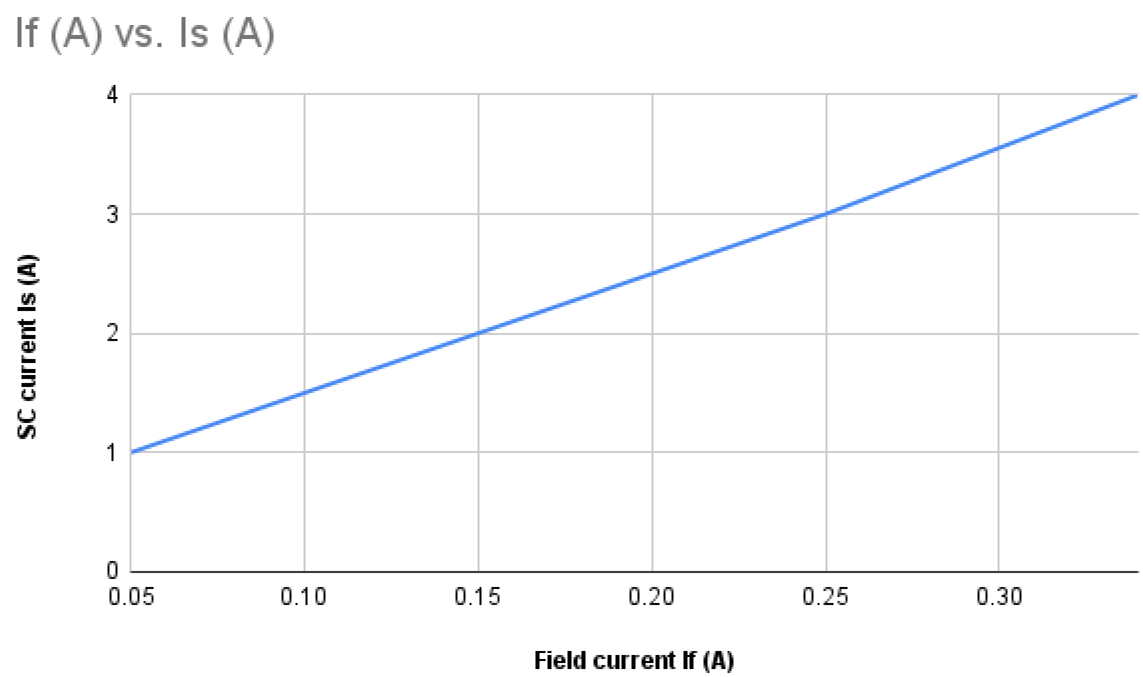
Terminal Voltage(Vt) in V	Field Current(If) in A
100	0.1

150	0.15
200	0.2
250	0.25
300	0.3
350	0.37
400	0.5
450	0.7



Short Circuit Test:

Is (A)	If (A)
1	0.05
2	0.15
3	0.25
4	0.34



Armature resistance per phase: 5.5 Ω
Field Resistance: 182 Ω
Effective value of armature resistance: 1.5 * 5.5 = 8.5Ω

Result:

1.For OCC, we see that because of saturation in iron parts of the machine, the no-load generated voltage IF does not increase in the same proportion as the increase in field current IF.

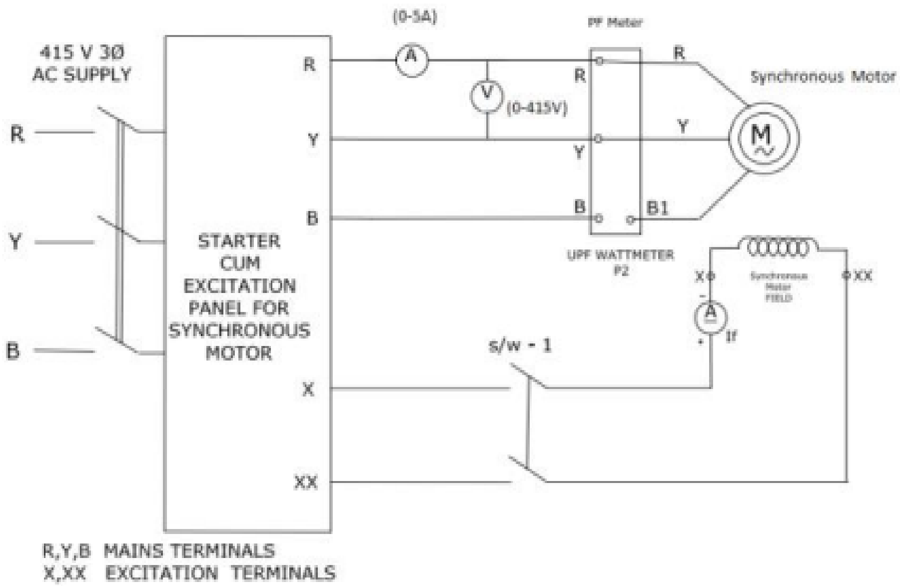
2.For SCC, field current vs armature current gives a linear plot.

Experiment- 4 B

V AND INVERTED V CURVES OF A SYNCHRONOUS MOTOR

Aim: To study and draw the V and inverted V curves of the synchronous motor.

Circuit Diagram:

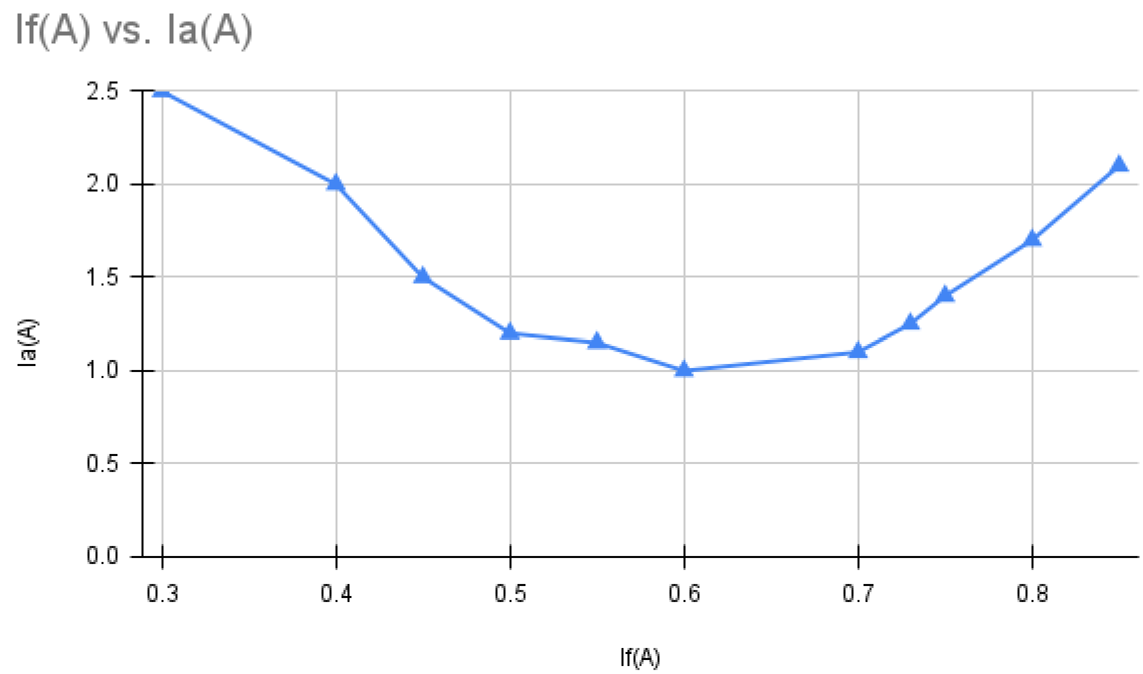


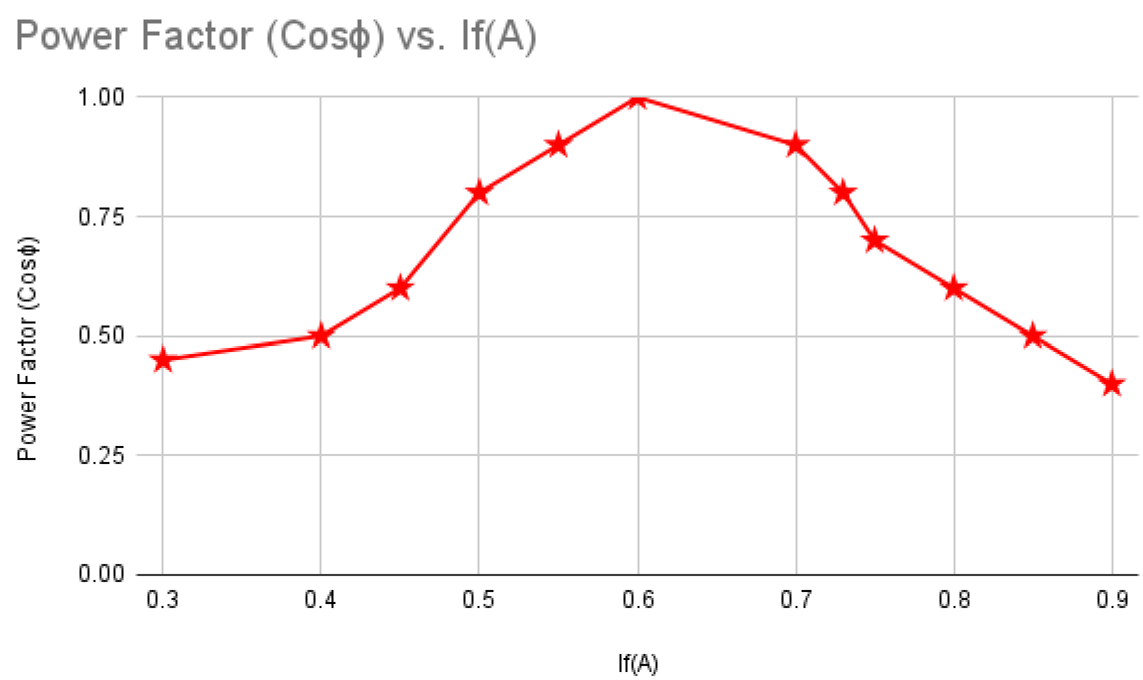
1: Connection diagram of synchronous motor for V and inverted V Curve

Observations:

Ia(A)	If(A)	Power Factor (Cosϕ)
2.5	0.3	0.45
2	0.4	0.5
1.5	0.45	0.6
1.2	0.5	0.8
1.15	0.55	0.9
1	0.6	1
1.1	0.7	0.9
1.25	0.73	0.8
1.4	0.75	0.7
1.7	0.8	0.6
2.1	0.85	0.5

2.4	0.9	0.4





Result:

1. For the V curve, as IF is varied from low to high, IA decreases and is minimum at unity power factor and then increases again.
Armature current has large values for low and high values of excitation.

2. For inverted V curve, power factor is lagging when the motor is under-excited and leading when it is over-excited.