Electrical Machines and Power Electronics Lab

Experiment-4

Determination of regulation of an alternator by synchronous impedance method.

Group: W02

Experiment 4A

AIM:

To determine the regulation of a three-phase synchronous machine by impedance method.

Precautions:

1)Make sure the connections were made properly.

2)Do not touch the rotor while it is rotating with a high RPM.

3)Do not turn off Excitation field during after synchronisation.

4) Do not wear loose clothes or hang the hair loose while conducting the experiment.

5)Always do experiment within rated parameters.

Summary Of Experiment:

Open-Circuit Test Characteristics:

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.

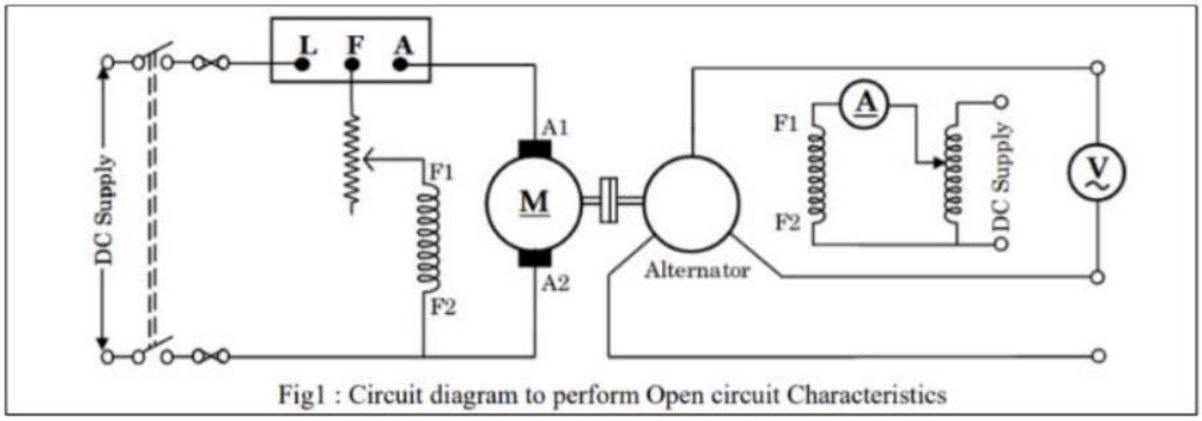
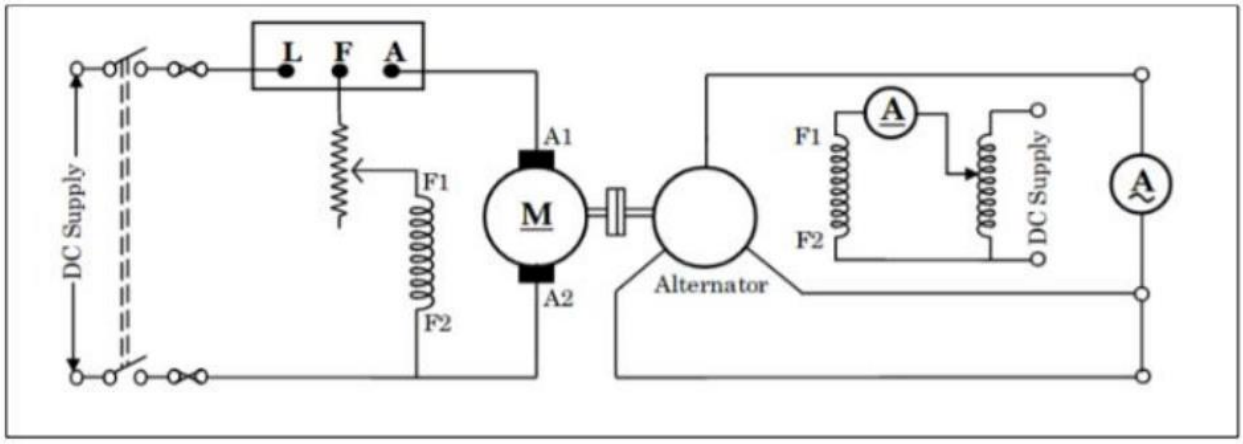


Fig1 : Circuit diagram to perform Open circuit Characteristics

Short-Circuit Test Characteristics:

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



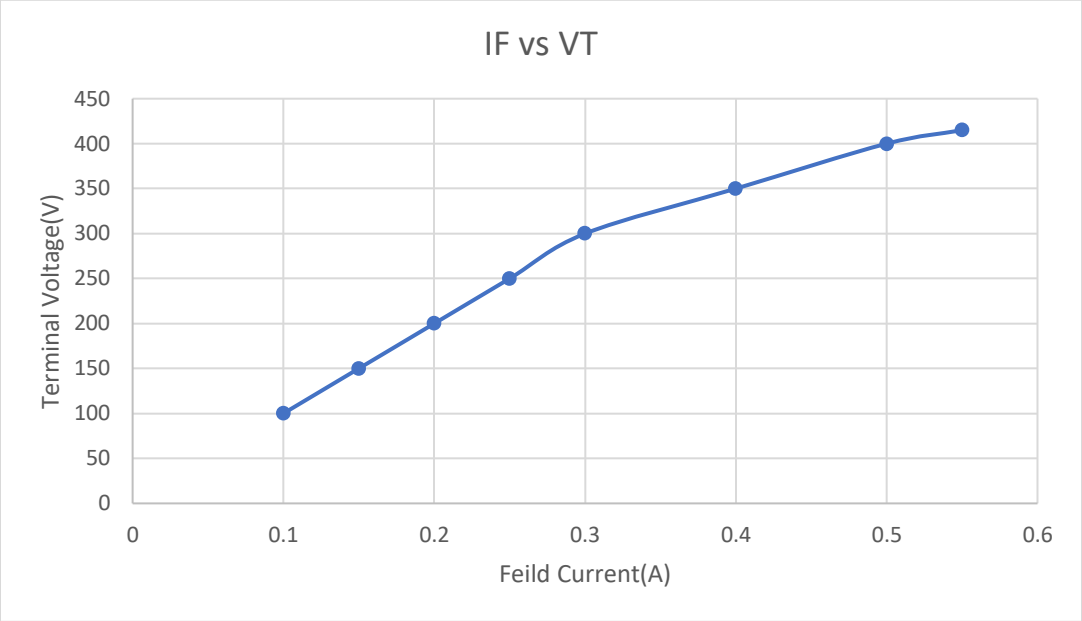
Observations

Open-Circuit Test Characteristics:

In this we started taking values initially by keeping voltage at rated voltage and then going till rated current and observed the changes in field current.

Field Current (I_F)	Terminal Voltage (V_T)
0.1	100
0.15	150
0.2	200
0.25	250
0.3	300

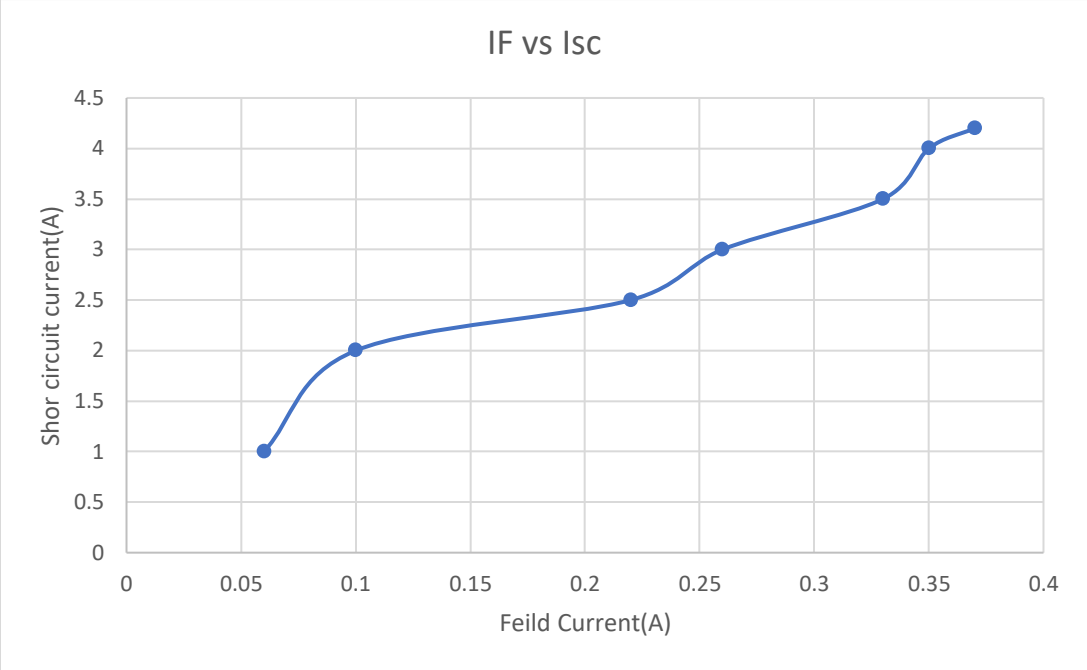
0.4	350
0.5	400
0.55	415



Short-Circuit Test Characteristics:

In this we started with rated current which was 4.2A and went till 1A and observed the change in field current

Field Current(IF)	Short Circuit current(Isc)
0.06	1
0.1	2
0.22	2.5
0.26	3
0.33	3.5
0.35	4
0.37	4.2



Armature resistance per phase: 5.5 Ω

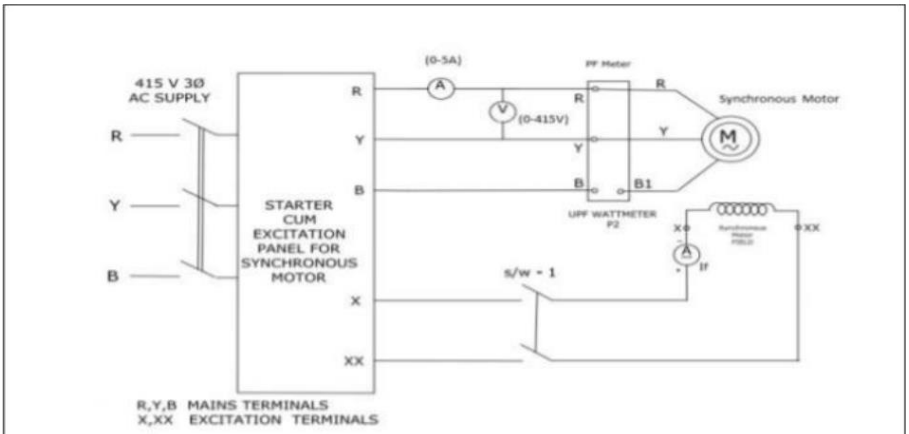
Field Resistance: 182 Ω

Effective value of armature resistance: 1.5 * 5.5 Ω = 8.25 Ω

Experiment 4B

V and Inverted-V curves of a synchronous motor.

Summary Of Experiment:

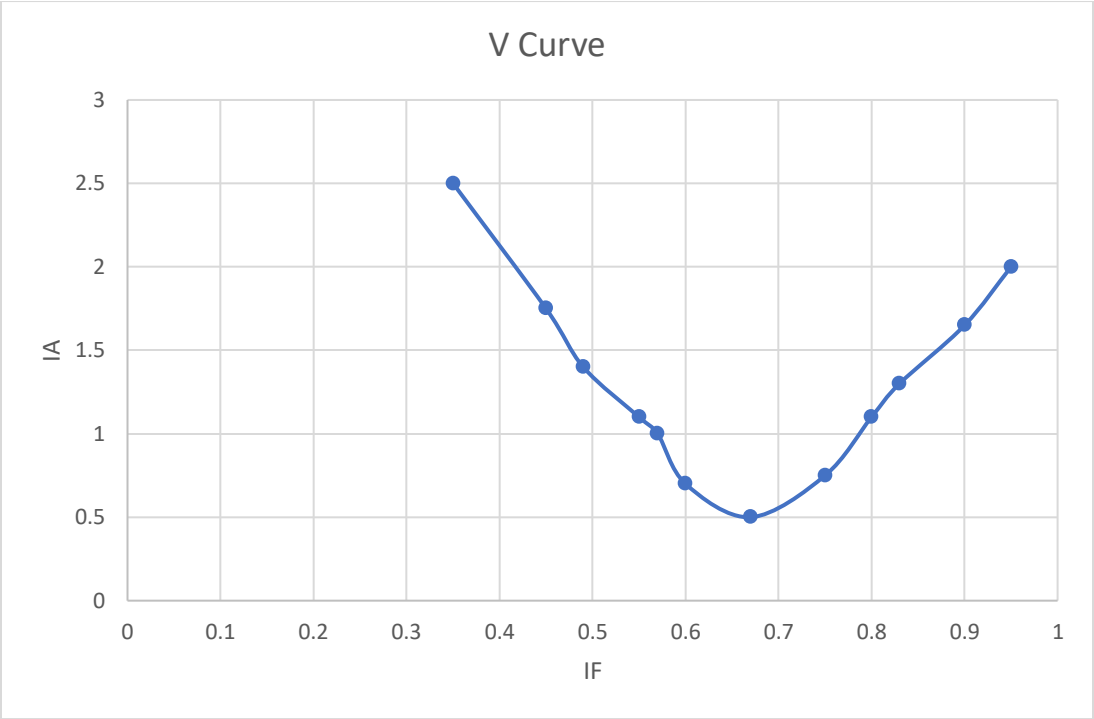


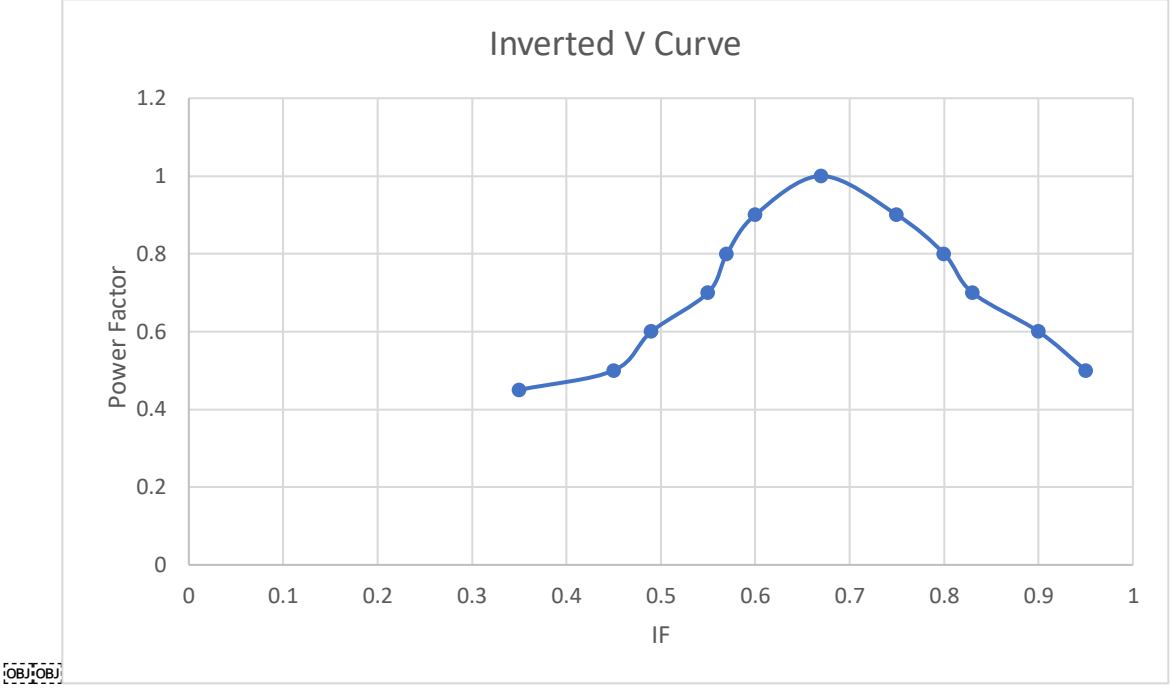
1: Connection diagram of synchronous motor for V and inverted V Curve

Experimental setup is switched off, circuit is built as above. Excitation pot is set at 40% of output position. Synchronous motor is set to excitation position. Excitation of the synchronous motor is varied in steps.

Observations:

IF	IA	Power Factor
0.35	2.5	0.45
0.45	1.75	0.5
0.49	1.4	0.6
0.55	1.1	0.7
0.57	1	0.8
0.6	0.7	0.9
0.67	0.5	1
0.75	0.75	0.9
0.8	1.1	0.8
0.83	1.3	0.7
0.9	1.65	0.6
0.95	2	0.5





OBJ OBJ

Results & Conclusions:

- In this experiment we determined the regulation of a three-phase synchronous machine by impedance method & plotted V and V-curves of synchronous motor.

- Where we did Open circuit and short circuit test.
- The values obtained through experiment are identical with theoretical values and we verified open-circuit test by ohms law.
- Whie doing the V-curve experiment we also checked the phase property by using 3, 100W bulbs.