Electrical Machines and Power Electronics Lab

Experiment-3

Study on voltage build-up in a shunt generator

Group: W02

AIM

To understand the voltage, build up in a shunt generator and find the values of critical resistance and critical speed, later verify them practically.

Precautions

1)Make sure the connections were made properly.

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

3)Check the polarity of the voltmeter by trial and error method. A small spike should be visible in the voltmeter.

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

Connection Diagram

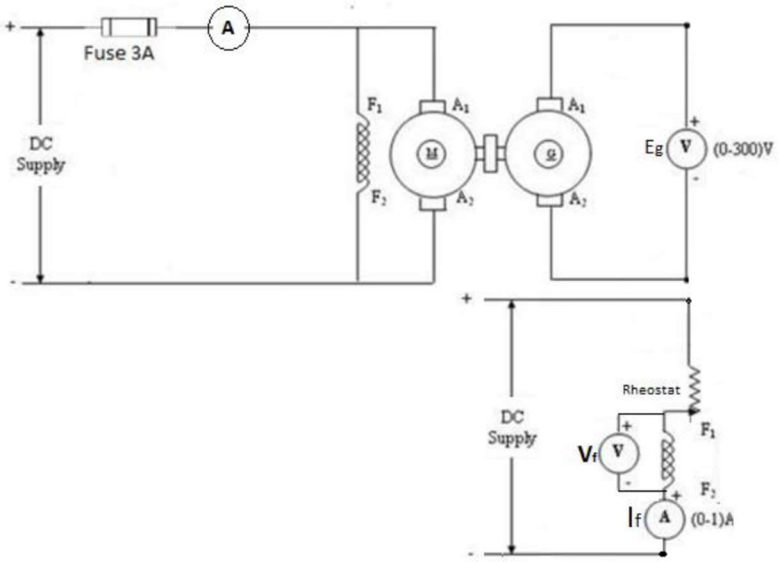

Fig 1: Connection diagram to perform the OCC on DC Generator set

Observations

I_F(A)	E_G(V)	V_F(V)
0	20	0
0.1	55	25
0.2	120	65
0.3	150	90
0.4	170	118
0.45	180	130
0.5	190	150

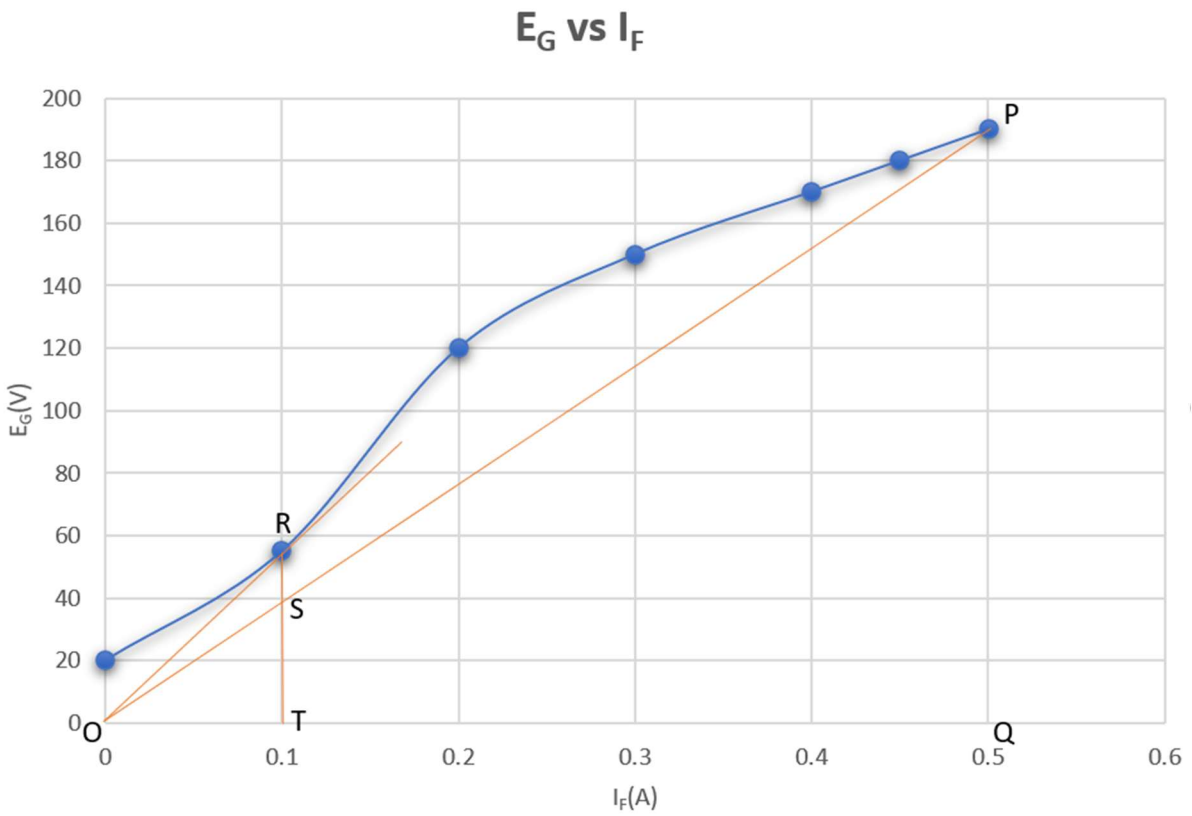

Fig 2: Generated Voltage vs Load Current

Calculations:

Rated Speed(N) = 1500 rpm

R_{field}= 330 Ω

PQ= 190

OQ= 0.5

RT= 55

OT= 0.1

RS= 15

ST= 20

Inherent Field resistance, $R_{inherent}$ = PQ/OQ = 380 Ω

Critical field resistance, $R_{critical}$ = RT/OT = 510 Ω

Critical speed, Nc = N ∗(ST/RT)= 545 rpm

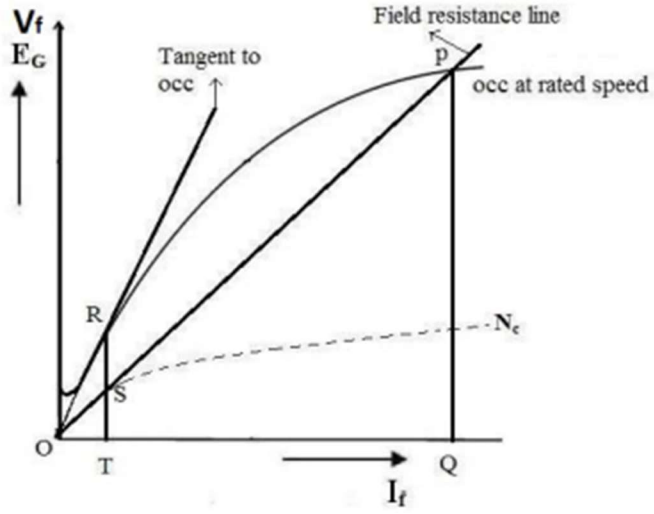

Fig 3:Theoritcal response

Results and conclusion:

→From the observations and calculations of this experiment, we can justify that the practical values and the theoretical values are in the same range. The graphs are also matching for both cases.

→ We also concluded that if the generator speed is lower than the critical speed, very low voltage is generated by the DC shunt generator

→ Got hands-on experience working on a DC shunt generator, its voltage build-up, correct polarity, residual magnetism properties