Experiment NO. 1:4

Characteristic of Self- Excited Shunt Generator

OBJECT :

The object of this Exp. is to verify some of the factors which effect process of voltage build-up in a self-excited shunt generator. Also, it is required to get No-load characteristic. And external characteristic.

THEORY:

When the field is so connect to the armature that the flux produced by the field current assist the flux of the residual magnetism then the generated voltage build - up and the process continues until as equilibrium point is reached between the magnetization curve and the field resistance line. When the field is separately-excited the generator will build-up for either polarity of the field and either direction of rotation, but when the field is self - excited, the generator does not build - up and develop rated voltage for the following reasons:

1. Absence of residual magnetism in the poles.
2. Field circuit connections reversed with respect to the armature circuit.
3. Field circuit resistance higher than critical field resistance for the speed used, or it can be said that the speed is less than resistance used.

PROCEDURES:

Take the name plate data of the generator used in the exp.

RUN (1) (No- Load characteristic**.)**

1. Connect the machine as separately - excited generator (fig 1) to draw the N.L characteristic.
2. Run the machine at rated speed. Obtain several readings or the field current I_F and Vo.c voltage at that constant speed (starting from $I_F = 0$

until Vo.c = 180 V).

3. Return slowly back with IF to zero and switch off its circuit.

Observation Table:

N= constant

	I_F / A	Vo.c / Volt

4. Connect the machine as self - excited shunt generator at N.L (i.e. the switch is open) (fig 2), Run the machine at rated speed and take the reading of I_F and Vo.c when it cases to increase. The line connecting the point of origin of the magnetization curve to the point of voltage obtained in this item will represent V.I characteristic of $R_{F.}$.

RUN (2): (External characteristic)

1. With connection of fig (2) at N.L (i.e. switch is open), choose R_{shl} which gives you Vo.c = 160V at rated speed and keep it constant.

2. Close the switch and change RL in approx. 5 equal steps, at each step take the readings of the terminal output voltage (V_L) and the load current I_L. Also take the reading of I_F.

Observation Table:

V_L	I_F / A	Vo.c / Volt

3. Repeat item (1) ,(2) for another R_{sh2} must be less than R_{shl} (i.e. Vo.c = 180 V). Keeping the speed constant at the rated value and tabulate the results as below:

V_L	I_L	I_F

4. Repeat item (3) with R_{sh2} = constant, but keeping the speed at lower than the rated speed at 1200 rpm. And tabulate the results as below:

V_L	I_L	I_F

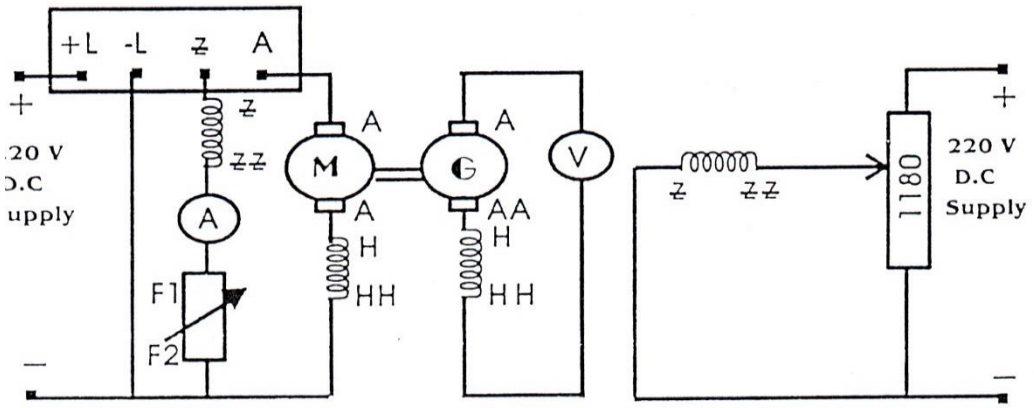

Fig. 1

DISCUSSION:

1. Draw the N.L chara. From run (1) and calculate RF, show different lines of shunt field resistance winding.
2. Draw the external chara. Obtain from the results of run (2).

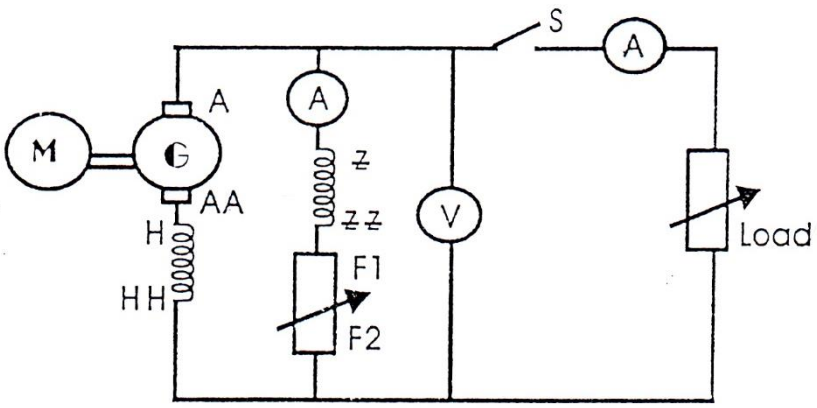

Fig. 2

3. How can the speed effect. on the N.L chara. And the external chara. Of the shunt generator?
4. Why is the fall in the terminal voltage for the external chara. greater in shunt generator than in separately - excited generator?