Objective:-speed (N) control of a DC shunt motor by field control method and to draw speed (N) vs. field current (I_f) characteristics.

Apparatus Used:-D.C shunt motor, D.C Ammeter(0-2A), D.C Voltmeter (0-250V), 3-point D.C Starter , Rheostat, tachometer

Theory:-

Back emf of DC motor

$$E_b = \frac{PNZ\Phi}{60A} = V - I_a R_a$$

So speed of DC motor

$$N \propto \frac{E_b}{\Phi}$$

$$N = K\frac{E_b}{\Phi} = K\frac{(V - I_a R_a)}{\Phi}$$

Where V= Applied voltage

I_a = Armature current

R_a = Armature resistance

Φ = Field flux

$\Phi \propto$ Field current (I_f)

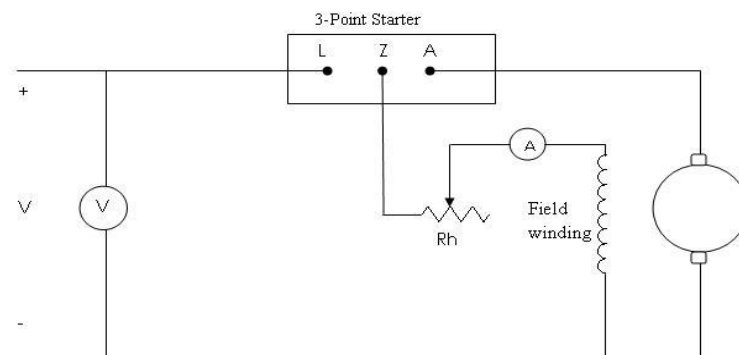Therefore speed of a D.C motor can be changed by following methods:-

1- By changing applied voltage (V)
2- By inserting a resistance in armature winding with R_a
3- By changing field current (i.e. by changing Φ) method is called Field control method

Hence speed can be changed by changing the field flux (Φ)and Φ can be changed by changing field current (I_f) and field current can be changed by inserting a resistance (Rheostat) in series with the field winding.

Prepared By :- Husain Ahmed	**Reviewed By :-** Mohamed Samir	**Approved By :-** Dr. A.K. Gupta

Connection Diagram:-

Observation:-

S.No	Field Current (I_f) in Amperes	Speed (N) in rpm

Result: - The speed vs. Field current characteristics is drawn on the attached graph.

Precautions:-

1. All the connections should be tight.
2. Never touch the live terminal during the experiment.
3. Before changing the connection, switch off the supply properly.
4. Increase the rheostat carefully and gradually.
5. Always use the starter of proper rating.
6. Always wear shoes when working in the lab. Avoid wearing loose clothes, hanging chains etc.
7. Make proper contact when measuring the speed with Tachometer.

Answer the following questions
Q1. How many types of speed control of DC motors are there?

Q2. Why the speed control of DC motor is easy in comparison to other motors?

Prepared By :- Husain Ahmed	**Reviewed By :-** Mohamed Samir	**Approved By :-** Dr. A.K. Gupta