CHITTAGONG UNIVERSITY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING
CHITTAGONG-4349, BANGLADESH.

Course No. EEE-184
Course Title: Electrical Drives Sessional

Expt. No. 04: DETERMINATION OF SERIES & SHUNT MOTOR CHARACTERISTIC CURVE.

INTRODUCTION:

The characteristic curves of a motor are those curves which show relationships of between the following quantities.

1. **Torque and armature current*i.e.* T_a/I_a characteristic.**-It is known as electrical characteristic.
2. **Speed and armature current *i.e.*N/I_acharacteristic.**
3. **Speed and torque i.e. N/T_a characteristic.**-It is also known as mechanical characteristics.
   While discussing motor characteristics, the following two relations should always be kept in mind :
   $T_a \propto \Phi I_a$ and $N \propto E_b/\Phi$.

THEORY:

Torque equation for shunt motor $T=K_2\Phi_f I_a^2$

Torque equqtion for series motor $T= K_2\Phi_f I_a=K_3 I_a^2$

Speed equation for shunt motor $S= K(V_t-I_aR_a)/ \Phi_f$

Speed equation for series motor $S= K(V_t-I_aR_a-I_aR_s)/ \Phi_f$

Torque, T=W*9.81*Distance

OBJECTIVE:

The purpose of this experiment is-

1. To derive the Torque and armature current T_a/I_a characteristic curve for series motor and shunt motor.

2. To derive the speed and armature current N/I_a characteristic curve for series motor and shunt motor.
3. To derive the Speed and torque N/T_a characteristic curve for series motor and shunt motor.

APPARATUS:

1. Lab Volt D.C. Series Motor
2. D.C. Shunt Motor
3. D.C. Ammeter(0-2 Amp)
4. Dl 10260 D.C. Shunt Breaking Generator
5. D.C. Voltmeter (0-50v)
6. Dynamometer

PROCEDURE :

SERIES MOTOR :

1. Series motor never switch on without load, because without load the speed of series motor is dangerously high and gets damaged due to heavy centrifugal forces.
2. Check carefully whether the load is connected to series motor or not.
3. At first switch on the motor, you should keep voltage fixed at 42 V. By changing the torque at Dynamometer. then take the different values of motor current, rpm, and voltage, speed of dc Series motor.

Note: In every step you should keep voltage fixed at 42 V.

CIRCUIT DIAGRAM

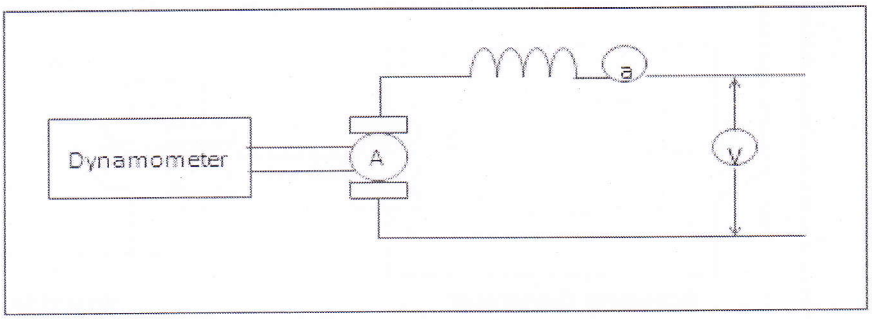

fig 1. Connection diagram for series motor

SHUNT MOTOR :

1. At first set connection according to fig-2, & switch on the motor at 42 V fixed.
2. For breaking generator load resistance is maximum.
3. By changing the resistance, current flow is changed, then find out the corresponding motor current, rpm, voltage, and weight balance.
4. For balancing ,there are a balancing rod and a weight. For different value of current balance the brake generator, each time take the distance on balancing rod to weight and put on a pencil mark on the balancing rod.
5. From this law, τ=W*9.81*DISTANCE, we can easily measure torque of shunt motor.

Note: In every step you should keep voltage fixed at 42 V.

CIRCUIT DIAGRAM

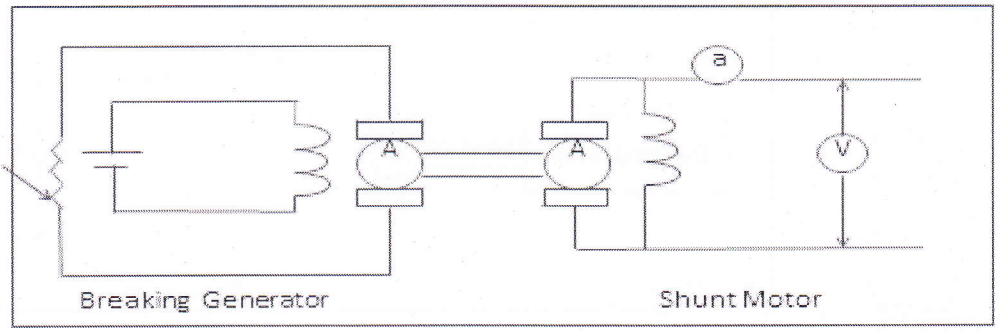

fig 2. Connection diagram for shunt motor

DATA TABLE :

Data table for D.C. shunt motor

Obs. No	Ia (Amp)	N (R.P.M)	V (Volt)	Distance	τ (N-m)

Data table for D.C. series motor

REPORT:

Obs. No	Ia (Amp)	N (R.P.M)	V (Volt)	τ (N-m)

1. Draw the SPEED vs ARMATURE current characteristics for SERIES MOTOR.
2. Draw the SPEED vs ARMATURE current characteristics for SERIES MOTOR.
3. Draw the SPEED vs TORQUE current characteristics for SERIES MOTOR.
4. Draw the TORQUE vs ARMATURE current characteristics for SHUNT MOTOR.
5. Draw the SPEED vs ARMATURE current characteristics for SHUNT MOTOR.
6. Draw the SPEED vs TORQUE current characteristics for SHUNT MOTOR.